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A NEW NAMA FROM IDAHO

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Among the plants sent recently to the Herbarium of the Missouri Botanical Garden is a *Nama* from the Snake River region of southern Idaho. A critical study of the plant indicates its relationship with *Nama demissum* Gray. The specimen in question, however, differs in important morphological characters from *N. demissum* and all other known species of the genus, hence it is described as new.

*Nama psammophilum*<sup>1</sup> Goodman, n. sp. Annual, depressed, 5-8 cm. high; stems branching and hirsute; leaves entire, narrowed to a winged petiole, the blade oblanceolate or elliptic, 1-2 cm. long, hispid, especially on the midrib and margin; cymes axillary and few-flowered, flowers shortly pedicellate; sepals linear-subulate, 8 mm. long, hirsute; corolla narrowly infundibuliform, 16-17 mm. long, sparsely hirsutulose, lobes orbicular, 4 mm. long; stamens unequal, attached near the middle of the corolla-tube; styles 7-8 mm. long, weakly cohering along the

<sup>1</sup> *Nama psammophilum* Goodman, sp. nov. Annuum, depresso, 5-8 cm. altum; caulis ramosus et hirsutus; foliis integris in petiolum alatum attenuatis, lamina oblanceolata vel elliptica, 1-2 cm. longa, hispida praesertim in nervo medio et margine; cymis axillaris paucifloris, floribus breviter pedicellatis; sepalis linearisubulatis, 8 mm. longis, hirsutis; corolla anguste infundibuliformi, 16-17 mm. longa, sparsae hirtella, lobis orbicularibus, 4 mm. longis; staminibus inaequalibus usque corollae medio tubo affixis; stylis 7-8 mm. longis, usque ad  $\frac{3}{4}$  longitudinis parae connatis; ovario pseudobiloculari; capsula oblonga, seminibus immaturis, ovis ca. 28.—Idaho: growing in sand, rim of Snake River Cañon, near Hagerman, May 22, 1930, *Miss Cora Shoop* (Mo. Bot. Gard. Herb. No. 1014289) TYPE.

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lower  $\frac{3}{4}$  of their lengths; each of the two false cells of the oblong capsule containing about 14 ovules.—Idaho: growing in sand, rim of Snake River Cañon, near Hagerman, May 22, 1930, Miss Cora Shoop (Mo. Bot. Gard. Herb. No. 1014289) TYPE.

The cohering styles of this species technically place it in the section *Conanthus*, but other and more important morphological structures indicate its relationship elsewhere. The habit, leaf-outline, shape of the sepals and corolla, the level of insertion of the stamens, the number of ovules in the capsule, as well as the geographic distribution, all indicate the relationship of the new species with *Nama demissum* Gray. *Nama psammophilum* is easily distinguishable from *N. demissum* in having larger leaves, longer sepals, and larger corolla, as well as in having technical differences in the structure of the filaments. In *N. psammophilum* there are no wings along the portion of the filament which is adnate to the corolla, nor is there the slight geniculation of the filament at the point of insertion.

# A MONOGRAPHIC STUDY OF THE GENUS LYCIUM OF THE WESTERN HEMISPHERE<sup>1</sup>

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## INTRODUCTION

The present study was undertaken at the suggestion of Dr. Ivan M. Johnston, who pointed out the lack of a comprehensive systematic treatment of the American species of the genus *Lycium* and the related genera. The consummation of the work was made possible through the assistance of various individuals to whom the writer wishes to extend his thanks at this time. Dr. G. T. Moore, Director of the Missouri Botanical Garden, has placed the library and herbarium of that institution at the writer's disposal; Dr. J. M. Greenman, under whose direction this study has been carried on, has been most generous with his time and helpful suggestions; Dr. Mildred E. Mathias, assistant to Dr. Greenman during the year 1929-30, and Dr. A. L. Grant, acting curator of the herbarium during Dr. Greenman's absence in the fall of 1930, offered constructive criticism and were instrumental in obtaining herbarium and bibliographical material; Dr. D. H. Linder offered many valuable suggestions during the preparation of the illustrations, took the photographs, and helped assemble the plates; and Miss Nell Horner, librarian of the same institution, has kindly helped in the assembling of the literature relative to the genus.

Dr. I. M. Johnston has given freely of his time in looking up literature at the Gray Herbarium and has been very generous with his valuable knowledge of distribution, geography, and botanical history. Dr. J. H. Barnhart, of the New York Botanical Garden, and the librarians of the Field Museum, Smithsonian Institution

<sup>1</sup> An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University, and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

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at Washington, Gray Herbarium, and Arnold Arboretum have all been extremely kind in their assistance in bibliographical matters. The curators of the herbaria at the British Museum, Botanical Garden and Museum of Berlin-Dahlem, Botanical Museum at Munich, Royal Botanical Garden of Brussels, and Museum of Natural History at Paris have supplied information or photographs relative to the type material deposited in their herbaria. Mr. R. H. Peebles, of the U. S. Field Station at Sacaton, Arizona, has been most courteous in supplying an abundance of fresh material of all the species of *Lycium* found in southern Arizona, preparing excellent series of specimens showing the range of variation within the species, and submitting carefully prepared field notes on color, habit, and habitat; Mr. A. Castellanos, of the Museo Nacional de Historia Natural de Buenos Aires, contributed a very valuable series of plants from Argentina, most of which were not represented elsewhere.

The curators of the following herbaria have loaned the material at their disposal, in part, or in its entirety:

- Brooklyn Botanical Garden through Dr. H. K. Svenson (B).
- Museo Nacional de Historia Natural de Buenos Aires (BA).
- University of California (C).
- California Academy of Sciences (CA).
- University of California at Los Angeles (UCLA).
- Delessert Herbarium at Geneva (D).
- Desert Laboratory of the Smithsonian Institution at Tucson, Arizona (DL).
- Field Museum of Natural History (F).
- Gray Herbarium of Harvard University (G).
- Herbarium of Mr. A. O. Garrett, Salt Lake City, Utah (GAR).
- Kew Herbarium (KEW).
- Missouri Botanical Garden (MBG).
- New York Botanical Garden (NY).
- Philadelphia Academy of Natural Sciences (PA).
- Pomona College (P).
- U. S. Field Station, Sacaton, Arizona (SAC).
- Santa Barbara Museum of Natural History (SBM).
- Stockholm Botanical Museum (ST).
- Leland Stanford University (S).

United States National Herbarium (US).

Herbario del Museo Comercial de Venezuela (Venez).

Natural History Museum of Vienna (V).

The abbreviations indicated in parentheses are those used in citing material in this paper. To these persons, and to various others who have helped in numerous details, I hereby acknowledge my indebtedness and gratitude.

#### HISTORY OF THE GENUS

The genus *Lycium*, although established by Linnaeus in 1753, was known long before this time by some of the older systematists, the herbalists. Pliny<sup>2</sup> mentioned *Lycium* as a specific which was good for sore eyes, inflammation, and various ailments. He stated that 'the best lycium comes from a spiny plant called pyxacanthos chironia.' Dioscorides<sup>3</sup> devoted about a page and a half to *Lycium*, referring to the above treatment by Pliny. Concerning its occurrence, he said, "Nascit plurimum in Cappadocia, Lycia & plaeisque aliis locis." He stated also that the fruit is like that of *Piper*, and recommended concoctions from various parts of the plant for relieving inflammation and kindred ailments.

In the 'Species Plantarum,' Linnaeus<sup>4</sup> included three species under *Lycium*, namely, *L. afrum*, *L. barbarum*, and *L. europaeum*. Of these three species, *L. afrum* appears to be the plant with which he was most familiar, and it was with entire justification that Dr. Hitchcock<sup>5</sup> selected it as the standard species for the genus.

Medicus,<sup>6</sup> in 1789, revived the Pre-Linnaean name of *Jasminoides*, placing *L. afrum* under that genus; his generic name must therefore be relegated to synonymy. In 1808, Necker<sup>7</sup> split the genus *Johnsonia* from *Lycium*. His description does not distinguish his new segregate from the older genus, and since he

<sup>2</sup> Plinius Secundus, C. Naturalis historia, lib. 24, capi. 14. [ed. J. Dalechamp 2: 1114. 1608.]

<sup>3</sup> Dioscorides: P. Dioscoridae pharmacorum simplicium reique medicae. lib. 8<sup>1</sup>: 54c-55a. Io. Ruellio interprete. Argentorat, 1529.

<sup>4</sup> Linnaeus, Species plantarum 1: 191. 1753.

<sup>5</sup> Hitchcock, A. S. Proposals by the sub-committee on nomenclature for the International Botanical Congress of 1930. 133. 1929.

<sup>6</sup> Medicus, Philosophische Botanik 1: 134. 1789.

<sup>7</sup> Necker, Elementa botanica. ed. 2. 2: 49. 1808.

did not list any species under *Johnsonia*, it too must fall to synonymy.

Kunth<sup>8</sup> treated the genus in three sections, based very largely upon characters of the calyx; however, he did not assign names to the divisions. The sections were:

1. "Calyx urceolatus, irregulariter 3-6-fidus; rarius (in *Lycio boerhaaviaefolio*) sinuato-quinquedentatus et regularis" etc. To this section he assigned *L. barbarum* and *L. europaeum*.

2. "Calyx urceolato-campanulatus, quinquedentatus-regularis" etc. Here, he placed *L. afrum*.

3. "Calyx urceolatus, saepissime irregulariter quinquefidus aut quinquedentatus" etc.

In 1838, Rafinesque<sup>9</sup> segregated several new genera from *Lycium*; and although his work is frequently disregarded, it must be taken into consideration here because of the synonymy his new genera have produced. He restricted the name *Lycium* to Kunth's first group, excluding a few of the elements therein. He then proposed the following new genera: *Pukanthus*, *Oplukion*, *Valteta*, *Diplukion*, *Ascleia*, *Teremis*, *Huanaca*, *Cantalea*, *Pederlea*, *Evoista*, and *Plicula*, all of which were very briefly characterized, so that some of them may be unquestionably reduced to synonymy under *Lycium*. It is interesting to note that he assigned *L. afrum* to his new genus *Oplukion*.

G. Don,<sup>10</sup> in 1838, used the three sections which Kunth had delimited, assigning names to these subdivisions of the genus, and listing thirty-four species. In the first section which he called *Eulycium*, "the true species of *Lycium*," he placed twelve species, nine of which, including *L. europaeum* and *L. barbarum*, were from the Old World, three being South American. The second section was called *Isodontia*, and included nine species, one of them being *L. afrum*. Only one South American species was assigned to this group, the remainder being from the Old World. Under the third section, *Anisodontia*, seven species, all South American, were placed; *L. carolinianum*, the only North American plant mentioned, was included under the caption

<sup>8</sup> Kunth, *Synopsis plantarum* 2: 179. 1823.

<sup>9</sup> Rafinesque, *Sylva Telluriana*. 52. 1838.

<sup>10</sup> G. Don, *Gen. Hist. Dichl. Pl.* 4: 457. 1838.

"species hardly known." Thus it is seen that, like Kunth, Don placed *L. afrum* under a group other than "true *Lycium*"; in this procedure he was followed by most of the subsequent authors.

Endlicher<sup>11</sup> treated the genus under the three sections *Eulycium*, *Lyciobatos*, and *Lyciothamnos*, basing the groups upon much the same characters that Kunth had used, namely, those of the calyx; however, he did not list species under the subdivisions. Walpers<sup>12</sup> followed Endlicher's method of subdividing the genus, using Don's terminology, however, and enumerating thirty-nine species, fifteen of which were placed under *Eulycium*, eleven under *Isonodontia*, seven under *Anisodontia*, and six under "species minus cognitae."

In 1845, Miers<sup>13</sup> created two new genera, *Lytioplesium* and *Chaenesthes*, to include some of the species formerly placed in *Lycium*, shifting the South American species, *L. obovatum*, *L. Meyenianum*, and *L. horridum*, to *Lytioplesium*, and giving most of the species of Endlicher's section *Anisodontia*, namely, *L. fuchsiioides*, *L. umbrosum*, *L. gesnerioides*, *L. loxense*, and *L. cornifolium* to the genus *Chaenesthes*.

Dunal,<sup>14</sup> in 1852, divided the genus into four new sections, *Schistocalyx*, *Eulycium*, *Amblymeris*, and *Lyciobatos*. The diagnostic characters he used were varied, but were based very largely upon calyx characters; forty species were recognized. Following Dunal's work, Miers<sup>15</sup> published a treatment of the genus, disagreeing with Dunal in many respects. He divided the genus into three sections, *Brachycope*, *Mesoscope*, and *Macrocope*, using corolla, rather than calyx, characters, and treating sixty-nine species, many of which were new. His disposition into sections was followed by Bentham and Hooker<sup>16</sup> and by Wettstein,<sup>17</sup> but the genus was placed in different tribes of the family by the latter two workers.

Terraciano<sup>18</sup> proposed a system of classification for the genus

<sup>11</sup> Endlicher, Genera plantarum. 667, no. 3863. 1841.

<sup>12</sup> Walpers, Rep. Bot. Syst. 3: 106. 1844.

<sup>13</sup> Miers, Hook. Lond. Jour. Bot. 4: 330. 1845.

<sup>14</sup> Dunal in De Candolle, Prodrromus 13: 508. 1852.

<sup>15</sup> Miers, Ann. & Mag. Nat. Hist. II, 14: 7. 1854.

<sup>16</sup> Bentham & Hooker, Gen. Pl. 2: 883. 1876.

<sup>17</sup> Wettstein in Engler & Prantl, Die Nat. Pflanzenfam. 4<sup>th</sup>: 13. 1891.

<sup>18</sup> Terraciano, Malpighia 4: 511. 1891.

in 1891 which is much too complicated to be of practical value. His concept of nomenclatural categories was radically different from that of any of the other workers in the Solanaceae, and his disposition of the New World species indicates that he did not have much knowledge of these members of the genus.

Aside from these more general treatments, species of North America have had an independent history from those of South America, and it is therefore more expedient to consider them in that light.

The first North American species to be described were *L. americanum*<sup>19</sup> and *L. carolinianum*,<sup>20</sup> both being made known to science in 1788. Dunal and Miers added new species in their respective publications, but Dr. Gray, working with the collections from the southwestern United States and Mexico, had occasion to publish by far the most of the species described from this continent. His synopsis of the genus in 1862<sup>21</sup> and his treatment of the group in the 'Synoptical Flora,'<sup>22</sup> where nineteen species and five varieties were maintained, are the only publications which cover the genus as a whole for the region under consideration. The various floras and manuals of the southwestern United States and Mexico need not be considered here since they add nothing material to the knowledge of the genus. The last paper of any significance is that of I. M. Johnston<sup>23</sup> dealing with the flora of Lower California, where seven species were listed and some of the problems relative to the status of *L. Richii* and *L. umbellatum* were straightened out.

The works of most importance concerning the South American species are those of Ruiz and Pavon,<sup>24</sup> Humboldt, Bonpland and Kunth,<sup>25</sup> Sendtner,<sup>26</sup> Remy,<sup>27</sup> Weddell,<sup>28</sup> and Philippi.<sup>29</sup> Among

<sup>19</sup> Jacquin, Stirp. Amer. Hist. 65. 1788.

<sup>20</sup> Walter, Fl. Carol. 84. 1788.

<sup>21</sup> Gray, Proc. Amer. Acad. 6: 45. 1862.

<sup>22</sup> Gray, Syn. Fl. N. Amer. ed. 2. 2: 237, 437. 1886.

<sup>23</sup> Johnston, Proc. Calif. Acad. Sci. IV, 12: 1153. 1924.

<sup>24</sup> Ruiz & Pavon, Flora Peruiana 2: 45. 1799.

<sup>25</sup> Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. Pl. 3: 50. 1818.

<sup>26</sup> Sendtner in Martius, Flora Brasil. 10: 153. 1846.

<sup>27</sup> Remy in Gay, Hist. Chile, Bot. 5: 91. 1849.

<sup>28</sup> Weddell, Chloris Andina 2: 108. 1857.

<sup>29</sup> Philippi, Florula Atacamensis. 43. 1860.

the more recent workers, Spegazzini, Rusby, P. Dusén, and U. Dammer have been perhaps the most instrumental in making species known to science, so that up to the present time there have been well over one-hundred species described from the Southern Hemisphere alone. Nowhere, however, has there been any attempt to straighten out the identity or the validity of these species, since Miers' paper, or even to present a key that the working botanists might use; therefore, the writer feels that any contribution he can make toward the interpretation of the specific and generic relationships of the North and South American *Lycia* will help to fill a definite need.

#### MORPHOLOGICAL CHARACTERS OF TAXONOMIC VALUE

*Roots*.—The root system of *Lycium* is relatively extensive in comparison with the aerial portion of the plant, frequently extending laterally as much as five or six meters, and attaining a thickness of two or more centimeters. They are extremely tough and fibrous, but present no characters of taxonomic significance.

*Stems*.—The stems vary considerably; they are, however, always perennial. A few species are dwarfed, the stem being but a few centimeters tall; in such instances, the plants are usually spreading in habit. In nearly all cases the stem is profusely branched; the branches may be short and rigid, flexuous, or even scandent. The spines are in all cases reduced branches; not only are all the young branchlets usually spinose tipped, but many species are densely armed with needle-like processes arising in the axils of the leaves.

*Leaves*.—The leaves in most of the species of *Lycium* are typically xerophytic; they are always alternate, and are borne in fascicles of from one to eight. Three general types may be noted:

1. Large, ovate or variously shaped leaves, thin in texture, with little or no pubescence, and slight cuticular development. This type of leaf is found in the more mesophytic species, such as *L. halimifolium*, *L. glomeratum*, etc.

2. Extremely fleshy leaves, covered with a thick cuticle. This type is found in the xerophytic species, resembling the leaves of *Sedum* in being extremely succulent. Such species as *L. carolinianum*, *L. Andersonii*, etc., have this type of foliage.

3. Less fleshy leaves, covered with dense pubescence, and often somewhat glandular. This is the most common type of foliage and is present in such species as *L. Cooperi*, *L. Fremontii*, *L. Parishii*, etc.

*Pubescence*.—The pubescence varies considerably, although the hairs are multicellular in all instances, as shown in text-fig. 1. In many of the South American species, such as *L. chilense* (figs. b-g), the hairs are forked, or even branched to the second or third degree, a type of pubescence which is, however, not common in the species native to the United States and Mexico. A rather

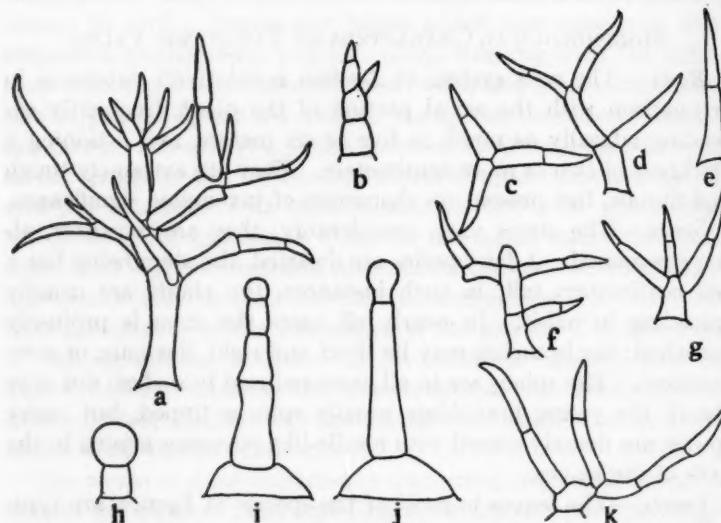


Fig. 1. Types of hairs in various species of *Lycium*: a, *cuneatum*; b-g, *chilense*; h, *Fremontii*; i, *Parishii*; j, *exsertum*; k, *Torreyi*.

common form is that found on *L. Fremontii*; here, as shown in fig. 1h, the leaves and calyx are covered with short stalked glands, giving the plant a viscid appearance. In other species the glands are much longer, as shown in fig. 1i, from the leaf of *L. Parishii*, and in fig. 1j, from the leaf of *L. exsertum*. The margins of the corolla-lobes are usually fringed or ciliate; in some instances, however, they are clothed with longer interlacing, branched hairs,

as shown in fig. 1k, from the corolla-lobe of *L. Torreyi*. In many species the leaves are covered with a mealy excrescence, which, according to Solereder, consists primarily of oxalate of lime. In *L. cuneatum* the leaves are densely covered with dendroid hairs as much as one-fourth millimeter long (fig. 1a).

*Inflorescence*.—The flowers in nearly all species are borne singly or in groups of two to four in the axils of the fasciculate leaves; in *L. Morongii* and *L. glomeratum*, however, the flowers are borne in glomerules of four to twenty at the nodes, much like the flowers of *Acnistus*.

*Pedicels*.—The length of the pedicel varies greatly within the genus and is of very little diagnostic significance.

*Calyx*.—The calyx of *Lycium* offers the most valuable morphological characters for a taxonomic treatment of the group, particularly the form, shape, and relative length of the lobes. Dunal based his sections upon these characters, as did most of the workers before him. These characters are not, however, as Miers pointed out, of sufficient value to delimit subgenera or sections. In all cases, the calyx is composed of a tubular portion with four to six lobes of varying length, the length being fairly constant within the species; however, *L. Parishii*, *L. Richii*, and *L. ciliatum* are notable exceptions. In some species, the tube is many times the length of the lobes, as in *L. Fremontii*, *L. repens*, and *L. humile*, whereas the other extreme is seen in *L. macrodon* where the lobes are as long as, or much longer than the tube. The calyx is usually split by the growing fruit, but is sometimes slightly accrescent.

*Corolla*.—The corolla is infundibuliform, obconic, or nearly tubular, commonly actinomorphic, although occasionally slightly zygomorphic; it is always constricted above the ovary and expanded somewhat, though sometimes but slightly, at the throat. It breaks away from the ovary near the base, and usually leaves a ring of tissue surrounding that organ. Because of the difficulty in delimiting the different parts of the tubular portion, "tube, throat, and limb," the writer has considered it best to designate the entire tubular portion of the corolla as "tube," and to give by measurements, the size and proportion of the various parts. The tube is usually glabrous exteriorly, but in some cases, e. g. *L.*

*Cooperi*, *L. chilense*, *L. distichum*, etc., it may have considerable pubescence on the back of the lobes or near the base of the tube, or in both places. It is nearly always pubescent interiorly, near the base of the filaments. The number of lobes varies, the dominant number being four or five, but rarely six or seven lobes occur. They are imbricate in aestivation, and may be rotate, somewhat reflexed, or nearly erect in anthesis; their margins, as previously stated, vary from glabrous to ciliate or lanate-ciliate. The length of the lobes varies greatly in many species, and even on the same individual plant there is sometimes much variation in this respect; in certain species, however, the length of the corolla-lobes is relatively constant and is a good taxonomic character. *Lycium Fremontii*, *L. Richii*, *L. Berlandieri*, and *L. Tweedianum* are species in which the length of the lobes is extremely variable; these species would all appear in two of Miers' sections. Because of this fact, it seems decidedly unwise and entirely artificial to try to delimit sections, as Miers did, on the length of the corolla-lobes.

*Stamens*.—The stamens are borne upon the corolla-tube alternate with the lobes. The point of juncture of the filaments varies with the species, and is of considerable specific value. In *L. verrucosum* they are adnate to the base of the lobes, but in all other species the point of separation lies between one-fifth and four-fifths the way from the base of the corolla-tube. In all but one or two instances, they are pubescent at or near the base. In the section *Selidophora* the base of the filament is enlarged, glandular, and fringed with a row of cilia. In the other species this glandular enlarged portion is lacking, and the base may be glabrous, in which case there is usually a fringe of hairs just above this point; in other species, the entire base of the filament may be pubescent. The filaments vary in length with the species, and they frequently show considerable variation within the species. They may be unequal, subequal, or equal. The pubescence of the filaments and their relative length are characters of taxonomic significance. The anthers are attached to the connective by their inner face from one-third to one-half the way from their base, and are longitudinally dehiscent. The two halves are frequently free from one another except at the tip and the point of juncture with the connective.

*Stigma*.—The stigma in all cases is enlarged, flattened, and very slightly two-lobed; it is glandular, but not pubescent. The shape and size is quite constant throughout the genus.

*Style*.—The style is slender, filiform, and several millimeters in length. Although the length varies much within the species, the relative length of the style is an important character which must be taken into consideration.

*Ovary and fruit*.—The ovary shows extreme variation within the genus, but its characters are quite constant within the species. The common type of ovary is that usually found in the family, that is, a bicarpellary, two-celled ovary which matures into a fleshy berry with a succulent and highly colored, usually red, pericarp. The placentation, as shown in pl. 12, fig. 7, is axile, the ovules being anatropous (pl. 12, fig. 5). The vascular system is interesting; in *L. exsertum*, for example, there are one dorsal and two lateral traces to each carpel. The lateral traces branch first, then the dorsal trace forks; subsequently, each of these strands again branches, so that there are twelve or fourteen separate strands of vascular tissue present at a point slightly below the ovuliferous portion. Next, the laterals again branch, the larger of the two strands moving inward to the placentae. Thus there are present in each carpel two traces which are but partially, if at all, fused, from which the vascular tissue running to the ovules has its origin. This fleshy type of fruit may be replaced by a drier type in which the pericarp becomes more sclerenchymatous, as in *L. cestroides*. *Lycium Cooperi* (pl. 13, fig. 6) has an unusual type of fruit. The upper halves of the carpels have a sclerenchymatous wall and separate readily. Externally, the fruit is somewhat cylindric, with a wedge-shaped apex, the whole being constricted about two-thirds the way from the base. One, sometimes two, seeds are borne in this upper part, and the pericarp is much hardened, a septum nearly dividing this top part from the lower portion. This basal part bears from five to nine seeds, the seeds frequently being somewhat smaller than those in the upper part. The pericarp of the lower chamber is usually much less sclerified than that of the upper, and the carpels do not separate. It is not uncommon to find three carpels developed in this species.

This type of fruit suggests a transition from the true berry to the next type, exemplified by *L. macrodon* (pl. 12, figs. 1-3, and pl. 13, fig. 1) and by *L. puberulum*. In these species, the two carpels are definitely divided into an upper and a lower compartment by a nearly complete, much-hardened septum which is continuous with the endocarp of the ovary-wall, as shown in pl. 12, fig. 1. The upper halves of the fruit are readily separated at maturity; the internal wall of each carpel is much hardened. Each of these compartments contains one or two seeds, which are unusually large. The lower half of the carpel differs in that the pericarp is somewhat fleshy, becoming but little, if at all sclerified. Each half contains several ovules, as shown in pl. 12, fig. 3, which are nearly always abortive, one or two infrequently developing to scarcely half the size of the seeds in the upper compartment. These lower halves of the carpels are not so readily separable as the upper halves. In *L. macrodon* three carpels are very frequently developed.

*Lycium californicum* and *L. Ameghinoi* present an extreme type in ovule reduction, as shown in pl. 12, figs. 4-6, and pl. 13, figs. 11-15. In these species, the endocarp is much hardened, and the two carpels separate readily at maturity. Each carpel contains one ovule which develops into a rather large seed.

This transitional series is of significance for two reasons: (1) it throws an interesting side-light into the interrelationships of the genus; and (2) it offers a suggestion as to the nature of the disc in the Solanaceae.

To consider first the nature of the disc—in many species of *Lycium* there is present below the ovary a bright red, pulpy mass of tissue which has been called a disc, although its exact morphological nature has never been investigated. From pl. 12, fig. 1, representing a longitudinal section of the ovary of *L. macrodon*, it can readily be seen that in this species, at least, the "disc" is composed of ovary tissue. The ovules which are present in the young ovary in the basal half of the carpel are apparently never fertilized—at least they do not develop into viable seeds, but, on the contrary, are manifest as abortive ovules in the unusually large "disc" of the older and mature fruit. Anatomical investigation of the fruit of other species of *Lycium* has not been made as

yet, so that it is not possible to state with certainty that the disc in the other species is of the same origin as that in *L. macrodon*, but that such is the case, the writer strongly suspects.

As to the relationship indicated by this series—the one-celled, one-seeded carpel of *L. californicum* and *L. Ameghinoi*, pl. 12, figs. 4–6, and pl. 13, figs. 11–15, approaches the fruit of some of the Verbenaceae very closely, on the one hand, whereas it also shows a rather close similarity to the fruit of *Grabowskia* of the Solanaceae (pl. 13, figs. 2–5), as is evidenced by the fact that Spegazzini placed *L. Ameghinoi* in *Grabowskia* because of the fruit characters. In so doing, however, he overlooked the fact that *Grabowskia* always has a two- or more-seeded carpel, the seeds being separated by a median longitudinal dissepiment. It is through *Grabowskia*, however, that the similarity in fruit characters between the Solanaceae and Verbenaceae is most clearly shown. Plate 13, figs. 7–10, represents the fruit of *Citharexylum brachyanthum*, a Verbenaceous genus, which resembles the fruit of *Grabowskia* very closely, the only marked difference between the two being that the embryo is straight in *Citharexylum* and curved in *Grabowskia*.

*Seeds*.—The shape of the seeds is determined very largely by their number in the carpel; they are usually somewhat flattened and ovate-triangular in outline. The surface is marked with small pittings. The embryo is curved, making nearly a half-turn, sometimes more. The cotyledons are long and slender, and the radicle points toward the basal portion of the seed.

#### GEOGRAPHICAL DISTRIBUTION

*Lycium* has an interesting geographical distribution in the New World; there are two centers of dispersal, namely, Arizona and Argentina. Of the fourteen native North American species, ten are found in southern Arizona, ten in northern Mexico, nine in southern California, five in Lower California, five in Texas, four in New Mexico, three in Utah, two in southern Nevada, one in Colorado, and one in the Gulf States. Two species are found in the West Indian Islands, one of them, *L. carolinianum*, occurring on the North American continent also, the other on the mainland of South America. A variety of *L. carolinianum* occurs in the Sandwich Islands.

There are thirty species found in South America; of these, twenty-two are found in Argentina (thirteen being endemic to that country), seven in Chile, four being endemic there, seven occur in Bolivia, four in Paraguay, two in Uruguay, Peru, and Brazil, and one in Colombia, Ecuador, the Galapagos Islands, and Venezuela. Thus it is seen that only eight of the thirty species do not occur in Argentina, whereas only two species are common to both Chile and Argentina.

Most of the species are members of the typical desert flora, but some of them, notably *L. Tweedianum* and *L. carolinianum*, seek brackish tide-lands or overflow land, whereas *L. Morongii* and its allies appear to follow river banks and flood-plains.

#### PHYLOGENY

From the evidence presented by a study of the American species, little can be definitely stated regarding the status of the different members of the genus. One fact stands out above the rest, and that is that in most cases the North American species find their closest relationships with South American species rather than with one another.

Considering first the North American species—*L. Richii* and *L. carolinianum* are fairly closely related, and probably find their nearest relative in *L. Tweedianum* of South America, one variety of which, var. *chrysocarpum*, reaches the West Indian Islands. Although *L. pallidum*, *L. puberulum*, *L. macrodon*, and *L. Cooperi* are but distantly related, they form a series which is well set off from the other members of the genus. Their origin is vague, but it is possible that they are closest to *L. Fremontii*, the latter species and *L. exsertum* resembling the South American *L. humile* and *L. repens*. *Lycium californicum* is very similar to *L. Ameghinii* of southern Argentina; *L. Berlandieri* shows relationship to *L. minimum*, *L. nodosum*, *L. Tweedianum*, and *L. vimineum* of the southern hemisphere. *Lycium Andersonii*, *L. Torreyi*, and *L. Parishii* form an aggregate which finds its counterpart in the austral species *L. fragosum*, *L. minutifolium*, *L. elongatum*, etc. Of the other South American species not mentioned, *L. cestroides*, *L. Morongii*, *L. cuneatum*, *L. Martii*, *L. cyathiformum*, and *L. glomeratum* show some points of similarity, especially the second,

third, and fourth. *Lycium chilense*, *L. ciliatum*, *L. Vergarae*, and *L. Comberi* form another aggregate, and *L. rachidocladum*, *L. tenuispinosum*, *L. pubescens*, and *L. ovalilobum* comprise a third, from which it is possible that *L. pubitubum* and *L. decipiens*

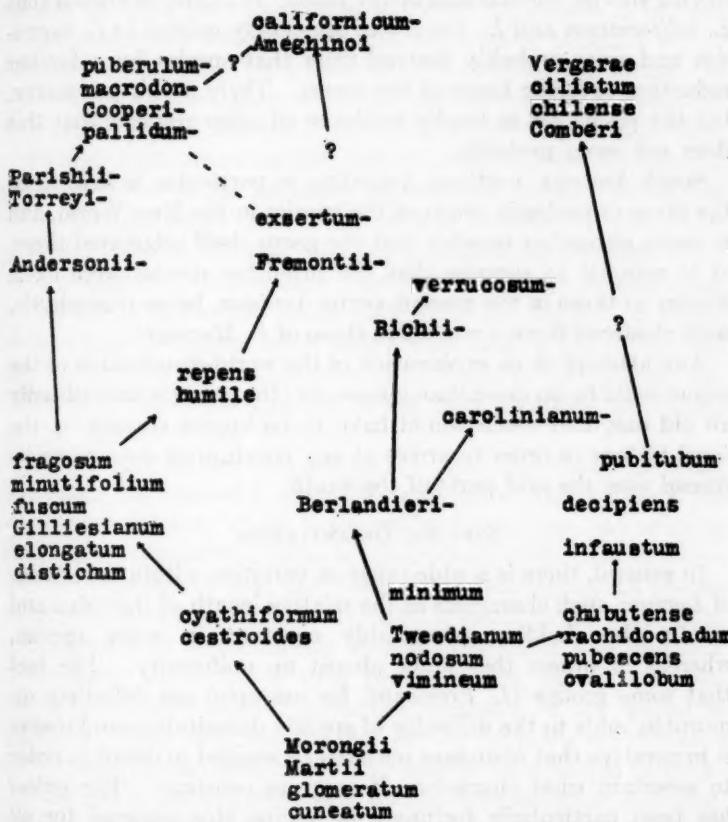


Fig. 2. Chart showing relationships of species of *Lycium*. The species followed by the dash are North American. (For *chubutense* read *tenuispinosum*.)

originated. Although there are thus seen to be several small groups of closely related species, the interrelationships of these groups are much more obscure. Text-figure 2 shows the situation more graphically.

The writer has assumed that *L. puberulum* and *L. macrodon* are the culmination of the line of advance of those species which have long tubular corollas, whereas *L. Ameghinoi* and *L. californicum* are the end of another line, a parallel series of forms having shorter corollas and longer lobes. It might be argued that *L. californicum* and *L. Ameghinoi* are closely related to *L. macrodon* and were probably derived from that species by a further reduction of fertile tissue of the carpel. There is this possibility, but the plants are so totally unlike in all other respects that this does not seem probable.

South America, northern Argentina in particular, is held to be the place of probable origin of the species in the New World, and it seems altogether possible that the genus itself originated there. It is rational to suppose that the primitive species were quite similar to those in the present genus *Acnistus*, being mesophytic, with clustered flowers much like those of *L. Morongii*.

Any attempt at an explanation of the world-distribution of the genus could be no more than guesswork; the genus is undoubtedly an old one, and much would have to be known concerning the fossil history in order to arrive at any conclusions concerning its spread over the arid parts of the world.

#### SPECIFIC DELIMITATION

In general, there is a wide range of variation within the species of *Lycium*, such characters as the relative length of the calyx and corolla-lobes holding remarkably constant in some species, whereas in others they show almost no uniformity. The fact that some groups (*L. Fremontii*, for example) are definitely dimorphic, adds to the difficulty of specific delimitation and makes it imperative that abundant material be studied in detail in order to ascertain what characters, if any, are constant. The writer has been particularly fortunate in having this material for all the North American species, and, to a lesser degree, for some of the South American species. The study of complete series of seasonal and ecological variations has made it possible to divide the genus into a relatively few large aggregates having well-marked geographical distribution in most instances, and resembling one another with a fair degree of constancy in most mor-

phological characters, but usually varying within the group in others. These aggregates constitute the species. Within the species it has frequently been found possible to delimit lesser groups also having distinctive geographic distribution, such units usually differing from each other and from the species in but one or two somewhat minor particulars, yet holding constant within the unit itself. They have been set off as varieties or forms. In thus delimiting the species of North America, it has been necessary to reduce the total number of described species very considerably.

The same procedure has been followed with the South American species in so far as the amount of material warranted. In the case of *L. chilense*, where there were perhaps one-third as many collections available as for all the other species of the southern hemisphere combined, it has been possible to work along such lines, as the list of synonyms under that name can testify. It seems certain that *L. chilense* is not only a wide ranging plant, but that there is here an unusual amount of variation in the leaf-size and leaf-shape—the various forms having been described previously as new species or new varieties.

With those species represented by few collections, however, the writer has deemed it advisable to be more conservative in his reductions, so that, where it cannot be shown that two or more forms can be linked by a series of specimens (in other words, where it cannot be shown that the variation is continuous) all species concerned have been conserved; where it seems to the writer that the species may be too closely related to be valid, and that lack of material, alone, keeps such proof obscure, opinions to this effect have been recorded under the discussion of the species in question. Thus, although the goal striven for is the maintenance of the same fundamental criteria for specific delimitation throughout the genus, the writer suspects that in those instances indicated, the species may prove to be of lesser value in the face of added evidence.

#### EVIDENCE OF HYBRIDIZATION

Although there is no experimental evidence to offer for the prevalence of hybridity in the genus, it seems certain that in at least four or five instances material of hybrid nature has been

collected. Hieronymus<sup>30</sup> recorded the occurrence of what he took to be a hybrid between *L. cestroides* and *L. argentinum* (*L. ciliatum*) in 1876, and in 1881<sup>31</sup> he reported a hybrid between *L. cestroides* and *L. elongatum*. As his discussion and figures show, these plants are almost exact intermediates between the species concerned.

Among the North American species, it would appear that *L. Andersonii* and *L. Torreyi* may occasionally hybridize where the ranges of the two species overlap—in the Coachella Valley of southern California and in Arizona and southern Utah. Throughout its range *L. Torreyi* has white-fringed corolla-lobes, and a more thick, but proportionately shorter, corolla-tube than *L. Andersonii*, the latter species having but sparsely ciliate corolla-lobes. However, where the two species occur together, forms have been collected having the slender corolla-tube and leaves of *L. Andersonii* but with the lobes of the corolla being lanate as in *L. Torreyi*, the habit of the plant being more like that of *L. Torreyi*. Similarly, at least one instance has been noted where *L. Richii* has apparently hybridized with *L. Torreyi*; this plant was collected in the Coachella Valley, the only region where the two species overlap in range.

Besides these more striking instances, it seems not unlikely that many of the intermediates may be due to this cause, a fact which, if substantiated, would tend to explain much of the variation within such species as *L. chilense* and *L. Fremontii*. In view of the ease with which other genera of the Solanaceae hybridize, it would be but expected to find considerable germinal compatibility between the members of this genus.

#### GENERIC RELATIONSHIPS

Miers<sup>32</sup> pointed out the fact that, if the species of *Lycium* described up to that time were all preserved in one genus, it would necessitate making the generic limitations so broad that several other genera would have to be merged with it, namely, *Acnistus*, *Salpichroa*, *Iochroma*, and *Chaenesthes* (the latter a new genus

<sup>30</sup> Hieronymus, Bol. Acad. Nac. Cienc. Cord. 2: 43. pl. 2, figs. 1-8. 1876; op. cit. 4<sup>1</sup>: 1. figs. 1-16. 1881.

<sup>31</sup> Miers, Hook. Lond. Jour. Bot. 4: 330. 1845.

which he proposed at that time). In order to avoid this difficulty he restricted the genus *Acnistus* to those species which are spineless trees or shrubs with umbellate or glomerate fascicles of flowers, with large leaves, and valvate-induplicate aestivation; they formed part of the sections called *Anisodontia* by G. Don and *Lyciothamnos* by Endlicher. He restricted the name *Lycium* to "those shrubs, mostly with small fasciculate leaves, whose branches terminate in spines that have only 1 or 2 flowers in each axil," and imbricate aestivation. He then proposed two new genera, one of them, *Chaenesthes*, to include several species that had previously been placed in *Lycium*, "trees or large shrubs, . . . having generally long crimson or orange colored flowers, . . . the corolla presenting a 5-lobed border, with 5 small teeth in the intermediate narrow plicatures, as in *Dunalia*." The other genus, *Lycioplesium*, with valvate-plicate aestivation—corolla-lobes acute with pubescent margins, spiny shrubs, with 1 or 2 flowers growing out of the fascicles of small fleshy leaves, "corolla—usually broader and more tubular than in *Acnistus* or *Lycium*," resembling *Dunalia*, but without intermediate lobes in the corolla. However, in 1848<sup>33</sup> he realized that his genus *Chaenesthes* was not generically distinct from *Iochroma* and reduced it to a section under that genus.

Dunal<sup>32</sup> accepted Miers' disposition of these genera; but Bentham and Hooker<sup>34</sup> reduced his *Lycioplesium* to *Acnistus*, pointing out the fact that Miers had combined species of several genera under his new genus; they also treated his *Chaenesthes* under *Iochroma*. *Lycium* and *Grabowskia* were included in tribe II, *Atropeae*, with imbricate aestivation; *Acnistus*, *Dunalia*, and *Iochroma* under Tribe I, *Solaneae*, with plicate, valvate, or induplicate aestivation.

Wettstein<sup>35</sup> made the same disposition of Miers' *Chaenesthes* and *Lycioplesium* that Bentham and Hooker made; however, he placed all the genera in the same tribe, *Solaneae-Lycineae*, *Lycium* and *Dunalia* being separated from *Acnistus* and *Iochroma* (*Iochroma*) by the characters "flowers single, rarely fascicled," as

<sup>32</sup> Miers, Hook. Lond. Jour. Bot. 7: 343. 1848.

<sup>33</sup> Dunal in De Candolle, Prodr. 13<sup>1</sup>: 3. 1852.

<sup>34</sup> Bentham and Hooker, Gen. Pl. 2<sup>1</sup>: 882. 1876.

<sup>35</sup> Wettstein in Engl. & Prantl, Nat. Pflanzenfam. 4<sup>3b</sup>: 10. 1891.

opposed to "flowers 2 or fascicled, rarely single." *Acnistus* was separated from *Iochroma* on the ground that its calyx did not enlarge in fruit. Because of the fact that there is considerable variation in the number of flowers in the fascicle, this treatment of these closely related genera seems unsatisfactory, and the author considers the treatment of Bentham and Hooker to be the more correct one. Although, as yet, it has not been possible to see representative material of many of the species of *Acnistus* and *Iochroma*, yet in those species of *Acnistus* which have been seen the corolla is certainly valvate-induplicate, whereas that of *Lycium* is invariably imbricate.

Macbride\* combined under *Dunalia*, several of the species which had previously been transferred back and forth between *Lycium* and *Acnistus*. His contention was that the basal appendages of *Dunalia* become so reduced in some species that the genus grades into *Acnistus*. He also pointed out that the glomerate inflorescence of *Acnistus* is not distinctive. From his descriptions, it seems possible that one or two of his species may belong to *Iochroma*; therefore, it seems to the writer that, until such a time as it is possible for a monographer to make a thorough study of these closely related genera, it is best to restrict those species with basal filament appendages to *Dunalia*, and to include the closely related species in *Iochroma* or *Acnistus* according to their other morphological characters. These five genera may be separated tentatively, as follows:

- A. Filaments without scales or appendages at base.
- B. Corolla imbricate.
  - C. Ovary of two, 2-seeded carpels, each carpel with a median longitudinal dissepiment, one seed in each cavity; flowers several in a reduced panicle or cyme (sometimes only 2 or 3).....*Grabowskia*
  - CC. Ovary of two, 1-many-seeded carpels, carpels not divided as above; flowers 1—several in the axils of the leaves.....*Lycium*
- BB. Corolla valvate-induplicate or plicate.
  - C. Corolla long-tubular, or narrowly tubular-infundibuliform, sometimes slightly inflated, lobes small, rounded, sometimes with small intermediate teeth; calyx enlarging somewhat in fruit; flowers borne in 2's or 3's, sometimes in glomerules.....*Iochroma*
  - CC. Corolla infundibuliform, with 5 ovate-acute or rounded lobes; calyx not enlarging in fruit; flowers borne in dense glomerules at the nodes, less commonly, few at the nodes.....*Acnistus*
- AA. Filaments with scales or lateral appendages at base.....*Dunalia*

\* Macbride, Field Mus. Publ. Bot. 8: 107. 1930.

## TAXONOMY

*Lycium* Linn. Sp. Pl. 1: 191. 1753; Gen. Pl. ed. 5, 88, no. 232. 1754; Kunth, Syn. Pl. 2: 179. 1823; G. Don, Gen. Hist. Dichl. Pl. 4: 457. 1838; Raf. Syl. Tell. 52, no. 261. 1838; Endl. Gen. Pl. 667, no. 3863. 1841; Walp. Rep. Bot. Syst. 3: 106. 1844; Martius, Fl. Brasil. 10: 153. 1846; Remy in Gay, Hist. Chil. Bot. 5: 91. 1849; Dunal in DC. Prodr. 13<sup>1</sup>: 508. 1852; Miers, Ann. & Mag. Nat. Hist. II, 14: 7. 1854, and Ill. S. Amer. Pl. 2: 94. 1857; Weddell, Chlor. And. 2: 108. 1857; Benth. & Hook. Gen. Pl. 2<sup>1</sup>: 900. 1876; Gray, Bot. Calif. 1: 542. 1876; Hemsley, Biol. Cent.-Am. Bot. 2: 425. 1882; Gray, Syn. Fl. N. Amer. 2<sup>1</sup>: 237. 1886; Wettstein in Engl. & Prantl, Nat. Pflanzenfam. 4<sup>3b</sup>: 13. 1891; Small, Fl. S. E. United States, 992. 1903; Reiche, Anal. Univ. Chil. 123: 392. 1908; Rob. & Fern. Gray's Man. Bot. ed. 7, 716. 1908; Reiche, Fl. Chil. 5: 312. 1910; Woot. & Standl. Contr. U. S. Nat. Herb. (Fl. N. Mex.) 19: 568. 1915; Abrams, Fl. Los Angeles & Vic. 323. 1917; Rydb. Fl. Rocky Mts. 758. 1917; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1285. 1924; Jepson, Man. Fl. Pl. Calif. 889. 1925.

*Jasminoides* Medicus, Phil. Bot. 1: 134. 1789.

*Johnsonia* Necker, Elem. Bot. ed. 2, 2: 49. 1808.

*Oplukion* Raf. Syl. Tell. 53, no. 266. 1838.

*Teremis* Raf. l. c. no. 271.

*Evoista* Raf. l. c. no. 289.

*Lycioplesium* Miers, Hook. Lond. Jour. Bot. 4: 330. 1845, in small part.

*Acnistus* Miers, l. c. 335, in small part.

*Grabowskia* Spegazzini, Anal. Soc. Cient. Argent. (Nov. Add. Fl. Patag.) 53: 166. 1902, in part.

Suffrutescent to fruticose, erect or spreading, shrubs or small trees, glabrous or pubescent, usually armed. Leaves alternate, commonly fasciculate, inner ones reduced, succulent or not succulent, entire or very minutely toothed, mealy, glabrate, or with multicellular, simple or forked hairs, frequently glandular. Flowers borne singly or in 2's-4's, rarely glomerate in leaf-axils, pedicels short, frequently reflexed. Calyx campanulate to tubular, ruptured by growing fruit, sometimes slightly accrescent, 4-6-lobed, lobes short-triangular to linear or ovate. Corolla whitish

to lavender or greenish-purple, obconic-tubular to infundibuliform or narrowly campanulate, actinomorphic or very slightly zygomorphic; limb commonly expanded somewhat; lobes 4-7, imbricate in aestivation, varying in length from longer than the tubular portion of corolla<sup>7</sup> to less than  $\frac{1}{6}$  its length, their margins commonly ciliate to lanate; corolla-tube usually glabrous externally, less frequently with considerable pubescence, commonly hairy within near base of filaments; stamens 4-6, filaments filiform, subequal to decidedly unequal, their base pubescent, glandular or glabrous, adnate to tubular portion of corolla. Anthers oval, thecae longitudinally dehiscent, affixed to connective near their middle. Stigma shortly 2-lobed, green. Style long and slender. Ovary bicarpellary, 2-celled, 2-many-seeded, fleshy to dry and sclerenchymatous, surrounded at base by a fleshy, often inconspicuous, disc. Seeds irregular in shape, minutely pitted. Embryo coiled, cotyledons long and slender.

Type species: *L. afrum* Linn. Sp. Pl. 1: 191. 1753.

#### SECTIONS

As was shown in the discussion of the morphology, the sections which have been made previously in the genus have all been based on very artificial and variable characters, so that it is not only impossible to place a given species in the section to which it belongs, but many of the species will key to more than one section. On ovary characters, *L. californicum* and *L. Ameghinoi* stand well apart from the rest of the genus because of the one-seeded, sclerenchymatous carpels. However, *L. puberulum* and *L. macrodon* have carpels approaching this condition, and *L. Cooperi* has a fruit resembling that of *L. macrodon*. Therefore, it would be possible (1) to delimit four sections on the character of the ovary, (2) to combine all the species into one section, or (3) to put *L. californicum* and *L. Ameghinoi* into a separate section, and to keep *L. macrodon*, *L. Cooperi*, and *L. puberulum* with the species of *Eulycium*. Because of the fact that the latter species are very similar to such species as *L. Fremontii* and *L. exsertum* in corolla characters, this disposition seems the most judicious method to pursue.

<sup>7</sup> In this paper, the term "tubular portion of corolla" is used to designate the "tube," "throat," and "limb" collectively. In this way the writer believes that much ambiguity may be avoided.

The group consisting of *L. chilense*, *L. ciliatum*, *L. Vergarae*, and *L. Comberi* forms another natural section characterized by enlarged glandular-based filaments, the glandular surface being surrounded by a fringe of cilia. In all the other members of the genus this enlargement is lacking and the pubescence is not confined to a fringe-like border.

#### KEY TO SECTIONS

- A. Filaments enlarged and glandular just above the point of attachment, this enlargement bordered with cilia; corolla usually pubescent exteriorly near the base. .... Section II. *Selidophora*<sup>33</sup> n. sect. (p. 312)
- AA. Filaments neither enlarged nor glandular, usually covered with hairs at or near the base; corolla seldom pubescent exteriorly near the base.
- B. Carpels 1-ovuled; fruit 2-seeded. .... Section III. *Sclerocarpellum* n. sect. (p. 325)
- BB. Carpels 2-many-ovuled; fruit 2-many-seeded, but if only 2-seeded, then with abortive ovules. .... Section I. *Eulyicum* G. Don (p. 206)

#### KEY TO SPECIES OF SECTIONS EULYCIUM AND SCLEROARPELLUM

- A. Flowers numerous, borne in glomerules at the nodes; tree-like forms with leaves<sup>34</sup> 1-8 cm. long, 0.8-3 cm. broad.
- B. Tubular portion of corolla 4.5 mm. or more long, persistent-pubescent exteriorly. .... 5. *L. glomeratum*
- BB. Tubular portion of corolla 4.5 mm. or less long, glabrate exteriorly.
- C. Calyx usually broader than long; filaments adnate to about 1 mm. above base of corolla-tube; plants of northeastern Brazil. .... 4. *L. Martii*
- CC. Calyx usually not broader than long; filaments adnate to point somewhat more than 1 mm. from base of corolla-tube; plants of Bolivia, Paraguay and northern Argentina.
- D. Leaves densely and persistently floccose-lanate; corolla-tube 1.25-1.75 mm. in diameter above ovary; calyx 1.5-2 mm. long. .... 3. *L. cuneatum*
- DD. Leaves glabrate; corolla-tube about 1 mm. in diameter above ovary; calyx 1.5-2.5 mm. long.
- E. Leaves 3-6 cm. long. .... 2. *L. Morongii*
- EE. Leaves 1-2 cm. long. .... 2a. *L. Morongii* forma *parvifolium*
- AA. Flowers few, 1-3 at the nodes (sometimes more); leaves seldom over 1 cm. wide (except *L. cestroides* and *L. cyathiformum*).
- B. Calyx-lobes from  $\frac{1}{3}$  as long to as long or longer than tubular portion, or if not  $\frac{1}{3}$  as long as tube, at least 2 mm. long, calyx cleft equally, never somewhat 2-lipped, therefore the lobes about equal in length.
- C. Corolla-lobes not over  $\frac{1}{3}$  as long as tubular portion, usually much less.

<sup>33</sup> *Celidophora* of Miers, Ann. & Mag. Nat. Hist. II, 14: 339. 1854.

<sup>34</sup> Because of the fact that the leaves of some species of *Lycium* are extremely succulent, they shrink greatly in diameter when dried. The measurements of leaf size given in this key apply to dried material only.

D. Plants of North America.

E. Filaments attached at summit of tubular portion of corolla.

EE. Filaments attached near middle of corolla-tube, or below.

F. Leaves glaucous-green; corolla-tube 4 mm. or more in diameter at summit.

G. Ovary 20-50-seeded.

GG. Ovary 4-8-seeded.

FF. Leaves not glaucous-green; corolla-tube less than 4 mm. in diameter at summit.

G. Fruit 2-4-seeded, with 1 or 2 fertile seeds in the top of each carpel, and abortive ovules in compartment below.

H. Calyx-lobes narrowly linear.

HH. Calyx-lobes oblong-ovate, not linear.

GG. Fruit not as above, with more than four seeds.

H. Corolla nearly tubular; ovary with hardened pericarp, with constriction near summit.

HH. Corolla more nearly infundibuliform; ovary a fleshy, globose or ovoid, several-seeded berry.

I. Corolla-lobes  $\frac{1}{4}$  as long as tube, usually 4 (5); filaments densely pilose at base; calyx glabrous to sparsely pubescent.

J. Calyx-lobes usually shorter than the tube; plants of the mainland of southern California, Baja California, and Mexico.

JJ. Calyx-lobes usually longer than the tube; plants chiefly of the islands off the coast of southern California.

II. Corolla-lobes  $\frac{1}{4}$ - $\frac{1}{3}$  as long as tube, 5; filaments sparingly pilose at base; calyx densely pubescent.

DD. Plants of South America.

E. Corolla glabrate, exteriorly, near base, but lobes usually sparingly ciliate.

F. Tube of corolla 13-18 mm. long.

G. Style exerted 2-4 mm.

H. Plants densely pubescent; corolla pubescent exteriorly.

HH. Plants sparsely pubescent; corolla glabrate exteriorly.

GG. Style not exerted over 2 mm.

FF. Tube of corolla less than 13 mm. long.

G. Filaments adnate to above center of corolla-tube.

GG. Filaments adnate to below center of corolla-tube.

H. Corolla-tube 11-12 mm. long.

HH. Corolla-tube less than 10 mm. long.

EE. Corolla pubescent exteriorly near base.

F. Corolla-tube 10-14 mm. long.

G. Style exerted 2-4 mm.; plants of Argentina.

..... 27a. *L. Gilliesianum* var. *longitubum*

..... 27. *L. Gilliesianum*

..... 28. *L. fuscum*

..... 23. *L. elongatum*

..... 26. *L. fragosum*

..... 17. *L. decipiens*

CC. Corolla-lobes more than  $\frac{1}{3}$  as long as tube.

D. North American (including W. Indies) and Pacific Island species.

E. Corolla-lobes as long as or longer than tube.

F. Leaves 1-2.5 cm. long, seldom over 2 mm. broad, 3-10 in a fascicle; plants of the region east of the Mississippi River and of the West Indian Islands. .... 19. *L. carolinianum*

FF. Leaves 1.5-3.5 cm. long, 2-5 mm. broad, 1-5 in a fascicle; plants of the region of the Mississippi westward and southward in Mexico, and from the Hawaiian Islands.

G. Plants scarcely spinose; flowers 6-9 mm. long.

H. Filaments sparsely pubescent at base; plants of the Hawaiian Islands .... 19c. *L. carolinianum* var. *sandwicense*

HH. Filaments densely pubescent at base; plants of Yucatan, Mexico. .... 19b. *L. carolinianum* var. *Gaumeri*

GG. Plants usually spinose; flowers about 1 cm. long. .... 19a. *L. carolinianum* var. *quadrifidum*

EE. Corolla-lobes shorter than tube (sometimes nearly equal to it).

F. Plants of the Galapagos Islands. .... 11. *L. minimum*

FF. Plants of North America. .... 21. *L. Richii* and var.

DD. South American mainland species.

E. Corolla-tube 6 mm. or more long.

F. Calyx-lobes oblong-ovate, rarely lanceolate; leaves 2-6 mm. broad, minutely glandular-pubescent. .... 15. *L. ovalilobum*

FF. Calyx-lobes lanceolate; leaves 1-3 mm. broad, densely tawny-pubescent.

G. Leaves 4-10 mm. long, 1 (2) mm. broad; calyx clothed with small glandular hairs interspersed with much longer flaccid hairs. .... 14. *L. tenuispinosum*

GG. Leaves 5-12 mm. long, 2-3 mm. broad; calyx uniformly glandular-pubescent.

H. Corolla-tube 6 mm. long, the lobes 3.5 mm. long. .... 14a. *L. tenuispinosum* var. *Friesii*

HH. Corolla-tube 7-8 mm. long, the lobes 4 mm. long. .... 14b. *L. Venturii*

EE. Corolla-tube 6 mm. or less long.

F. Filaments attached at or above middle of corolla-tube, pilose at base; leaves 2-4 mm. broad. .... 15. *L. rachidocladum*

FF. Filaments attached below middle of corolla-tube, glabrous at base, but pilose above; leaves 0.5 mm. broad. .... 12. *L. pubescens*

BB. Calyx-lobes less than  $\frac{1}{3}$  as long as tube, usually less than 2 mm. long, frequently irregularly cleft, and more or less 2-lipped.

C. Corolla-lobes shortly but densely white-lanate-ciliate, pubescence usually visible to the unaided eye as a white fringe.

D. South American species.

E. Corolla-tube 12-18 mm. long. .... 6. *L. cestroides*

EE. Corolla-tube 10 mm. or less long. .... 7. *L. cyathiformum*

DD. North American species..... *30. L. Torreyi*  
 CC. Corolla-lobes smooth or ciliate, not densely lanate-ciliate, pubescence usually not visible to the unaided eye.  
 D. Ovary 2-ovuled; fruit 2-seeded (section *Sclerocarpellum*).  
   E. North American species; lobes of corolla nearly equal to tube..... *45. L. californicum*  
   EE. South American species; lobes of corolla  $\frac{1}{6}$ - $\frac{1}{5}$  as long as the tube..... *44. L. Ameghinii*  
 DD. Ovary several- to many-ovuled; fruit 2-many-seeded.  
   E. North American species.  
     F. Corolla-lobes less than  $\frac{1}{3}$  as long as tube.  
       G. Filaments adnate to the top of the corolla-tube. *22. L. verrucosum*  
       GG. Filaments adnate to the lower  $\frac{2}{3}$  of the corolla-tube.  
         H. Leaves 3 mm. or more broad.  
           I. Stamens exserted 2-3 mm..... *35. L. exsertum*  
           II. Stamens usually exserted less than 2 mm.  
         J. Plants usually pubescent, rarely glabrate.  
           K. Calyx-tube 2-5 mm. long; lobes seldom over  $\frac{1}{4}$  length of tube.  
             L. Calyx 3-8 mm. long.  
               M. Leaves 10-25 mm. long, 3-6 mm. broad..... *34. L. Fremontii*  
               MM. Leaves 15-30 mm. long, 7-15 mm. broad..... *34a. L. Fremontii* var. *congestum*  
               LL. Calyx 4 (6) mm. or less long..... *35. L. exsertum*  
               KK. Calyx-tube 1.5-2.5 mm. long; lobes  $\frac{1}{5}$  length of tube or longer..... *31. L. Parishii*  
         JJ. Plants scurfy, glabrate. *29a. L. Andersonii* var. *Wrightii*  
       HH. Leaves 3 mm. or less broad.  
         I. Style exserted 4-7 mm. *20b. L. Berlandieri* var. *longistylum*  
         II. Style exserted less than 4 mm.  
           J. Corolla, including lobes, 6-8 mm. long, 2-4 times as wide at top as at base (except in *L. Berlandieri* var. *brevilobum*); young branches not spinose.  
           K. Corolla-lobes about 1 mm. long; tube 4-5 mm. long, little wider at top than at bottom..... *20d. L. Berlandieri* var. *brevilobum*  
           KK. Corolla-lobes over 1 mm. long; tube 4-6 mm. long, much wider at top than at bottom.  
             L. Stamens exserted less than 2 mm.; corolla-lobes not more than  $\frac{1}{6}$  length of tube.  
               M. Flowers 6-8 mm. long..... *20. L. Berlandieri*  
               MM. Flowers 4-6 (8) mm. long..... *20a. L. Berlandieri* f. *parviflorum*  
             LL. Stamens exserted over 2 mm.; corolla-lobes  $\frac{1}{3}$  length of tube or more..... *20c. L. Berlandieri* var. *peninsulare*  
         JJ. Corolla, including lobes, 5-16.5 mm. long, slender, not over  $2\frac{1}{2}$  times as wide at top as at base; young branches usually spinose.

- K. Leaves glabrous or nearly so; calyx irregularly lobed, sparsely pubescent or glabrate.
  - L. Flowers usually 4-merous, corolla-tube 4-7 mm. long ..... 29a. *L. Andersonii* var. *Wrightii*
  - LL. Flowers usually 5-merous, corolla-tube 7-14 mm. long.
    - M. Leaves 20-35 mm. long; plants of the Colorado Desert of southern California, and adjacent Arizona. .... 29b. *L. Andersonii* f. *deserticola*
    - MM. Leaves 3-15 mm. long; plants of southwestern United States and northwestern Mexico. .... 29. *L. Andersonii*
    - KK. Leaves densely pubescent; calyx regularly lobed and persistently pubescent. .... 31. *L. Parishii*
- FF. Corolla-lobes at least  $\frac{1}{3}$  as long as the tube.
  - G. Calyx tubular, 3-6 mm. long; lobes not over 1 mm. long. .... 34. *L. Fremontii* and var.
  - GG. Calyx cup-shaped, 2-4 mm. long; lobes varying in length.
    - H. Corolla 4-lobed; lobes equal to or longer than tube. .... 19. *L. carolinianum* and vars.
    - HH. Corolla 5-lobed, or, if 4-lobed, the lobes not equal to the tube.
      - I. Cultivated species, frequently established in nature; leaves glabrate, at least some of them over 10 mm. wide. .... 1. *L. halimifolium*
      - II. Native species; leaves less than 10 mm. wide, or if over 10 mm. wide, then densely pubescent.
        - J. Plants of the West Indian Islands and South America.
          - K. Calyx 2.5-4 mm. long; corolla-tube 4.5-6.5 mm. long. .... 10. *L. Tweedianum*
          - KK. Calyx 1-2 mm. long; corolla-tube 4-5 mm. long. .... 10a. *L. Tweedianum* var. *chrysocarpum*
        - JJ. Plants of the mainland of North America, and islands off California.
          - K. Corolla, including lobes, 7-15 mm. long; leaves spatulate, fleshy, 3-10 mm. broad. .... 21. *L. Richii* and var.
          - KK. Corolla, including lobes, 6-8 mm. long; leaves linear to elliptic-spatulate, 1-2.5 mm. broad. .... 20. *L. Berlandieri* and vars.
      - EE. South American (including Galapagos Islands) species.
        - F. Dwarf plants, spineless, seldom more than 15 cm. tall.
          - G. Filaments and interior of corolla-tube glabrous. .... 33. *L. repens*
          - GG. Filaments and interior of corolla-tube with some pubescence. .... 32. *L. humile*
        - FF. Shrubs, upright or spreading, over 15 cm. tall, usually spinose.
          - G. Corolla-tube 13-18 mm. long.
            - H. Leaves obovate, 4-6 mm. broad; style equal to corolla-tube or slightly exserted. .... 28. *L. fuscum*

- HH. Leaves linear-spatulate, 1-3 mm. broad; style exserted 2-4 mm. .... 27. *L. Gilliesianum* and var.
- GG. Corolla-tube less than 13 mm. long.
  - H. Corolla-lobes less than  $\frac{1}{4}$  length of tubular portion.
    - I. Filaments adnate to the corolla-tube for more than half its length; calyx 3-5 mm. long, lobes very slender; corolla 5-lobed. .... 23. *L. elongatum*
    - II. Filaments adnate to the corolla-tube for less than half its length; calyx seldom over 3 mm. long, lobes broad; corolla 4-lobed.
      - J. Corolla pubescent exteriorly near base; plants of southern Argentina. .... 18. *L. pubitubum*
      - JJ. Corolla glabrous exteriorly; plants of Chile, probably ranging northward to southern Peru.
        - K. Stamens and style 1-2 mm. shorter than corolla-tube. .... 26. *L. fragosum*
        - KK. Stamens and style equal to or longer than corolla-tube. .... 24. *L. minutifolium*
  - HH. Corolla-lobes at least  $\frac{1}{4}$  length of tubular portion.
    - I. Plants of the Galapagos Islands. .... 11. *L. minimum*
    - II. Plants of the mainland or West Indian Islands.
      - J. Calyx 1-1.5 (2) mm. long. .... 9. *L. nodosum*
      - JJ. Calyx 2 mm. or more long.
        - K. Corolla-lobes 2-2.5 mm. long, tube 4-5 mm. long; filaments not adnate to middle of corolla-tube. .... 8. *L. vimineum*
        - KK. Corolla-lobes 2.5-4 mm. long, tube 4.5-7 mm. long; filaments adnate to middle of corolla-tube or above.
          - L. Leaves 0.5-1 (4) mm. broad; corolla-lobes less than twice as long as broad; plants of central Argentina. .... 16. *L. infaustum*
          - LL. Leaves 2-15 mm. broad; corolla-lobes 2-3 times as long as broad; plants of the West Indies, Venezuela to northern Argentina. .... 10. *L. Tweedianum* and var.

### Section I. EULYCIUM G. Don

Section EULYCIUM G. Don, Gen. Hist. Dichl. Pl. 4: 458. 1838,  
char. emend.; Endl. Gen. Pl. 667. 1841; Dunal in DC. Prodr. 13<sup>1</sup>:  
509. 1852.

*Isodontia* G. Don, l. c. 459, in large part.

*Anisodontia* G. Don, l. c. 460, in large part.

*Lyciobatos* Endl. l. c.; Dunal, l. c. 523.

*Amblymeris* Dunal, l. c. 521, in large part.

*Brachycope* Miers, Ann. & Mag. Nat. Hist. II, 14: 7. 1854.

*Mesoscope* Miers, l. c. 182.

*Macrocope* Miers, l. c. 336, in large part.

Carpels 2-many-ovuled. Fruit 2-many-seeded, if 2-seeded, with abortive ovules below. Filaments glabrous or pilose at base, but not with enlarged, fringed, glandular portion.

1. *L. halimifolium* Mill. Gard. Dict. ed. 8. 1768; Rob. & Fern. Gray's Man. Bot. ed. 7, 716. 1908; Woot. & Standl. Contr. U. S. Nat. Herb. (Fl. N. Mex.) 19: 569. 1915; Bailey, Cycl. Hort. 4: 1930. 1916; Tidestrom, Contr. U. S. Nat. Herb. (Fl. Utah & Nev.) 25: 471. 1925. Pl. 15, figs. 27-29.

*L. barbarum* L. var. *vulgare* Aiton, Hort. Kew. 1: 257. 1789.

*L. vulgare* (Ait.) Dunal in DC. Prodr. 13<sup>1</sup>: 509. 1852; Miers, Ann. & Mag. Nat. Hist. II, 14: 185. 1854, and Ill. S. Amer. Pl. 2: 120, pl. 70B. 1857; Gray, Man. Bot. ed. 5, 382. 1868, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 237. 1886; Britton, Man. N. U. S. & Can. 816. 1901; Small, Fl. S. E. United States, 992. 1903; Rydb. Fl. Rocky Mts. 758. 1917.

*L. vulgare*  $\alpha$  *normale* Terrac. Malpighia 4: 511. 1891, in part.

A sparingly branched, spreading to recumbent or climbing shrub 1-6 m. tall; branches with slender, sharp spines about 1 cm. long, or spineless, glabrous, silvery-tan; leaves ovate, ovate-lanceolate, elliptic, or rarely spatulate, 2-6 cm. long, 0.5-2.5 cm. broad, attenuate at base to a distinct petiole 3-10 mm. long, glabrous, midnerve and lateral nerves usually plainly visible, margin entire, apex obtuse to acuminate; flowers borne singly or in 2's or 3's at the nodes, on pedicels 1-2 cm. long; calyx cup-shaped, glabrous, about 2.5 mm. long, usually 5-lobed, the lobes about half as long as the tube; corolla lavender, rotate-campanulate, tube 3-7 mm. long, 1 mm. or less in diameter at top of ovary, about 3 mm. in diameter at summit, glabrous without, lobes (4) 5, oval, scarcely as long as the tube, sometimes only  $\frac{1}{3}$  as long, margins not ciliate; stamens about as long as the corolla, but apparently much exserted, due to the spreading of the lobes, filaments subequal, adnate to middle of corolla-tube, glabrous at point of adnation, but corolla-tube and filaments bearing tufts of hairs just above this region, anthers 1 mm. or less long; style equalling or exceeding the stamens; berry ovoid, fleshy, about 1 cm. long and  $\frac{1}{2}$ - $\frac{2}{3}$  as thick, salmon-red, 10-20-seeded.

Distribution: a commonly cultivated plant throughout most of the United States, West Indies, and parts of Mexico; frequently well established as an escape from cultivation.

Representative material:

CANADA: Port Mouton, Queens Co., Nova Scotia, Aug. 18, 1920, *Bissell & Graves* 22404 (G, NY, PA).

UNITED STATES OF AMERICA: roadside, s. of Grace Point, Block Island, Rhode Island, Sept. 15, 1913, *Fernald, Long & Torrey* 10346 (G, PA); grassy roadside, Cayuga Heights, Ithaca, New York, Sept. 18, 1914, *Wiegand* 3108 (NY); College Point, New Jersey, Sept. 1879, *Schrenk* (US); Mt. Crawford, Rockingham Co., Pennsylvania, Aug. 7, 1893, *Heller & Halbach* 1171 (C, F, NY, PA, US); Ellicott City, Maryland, Sept. 1816, *Arsène 1388* (US); Georgetown, District of Columbia, July 29, 1893, *Boettcher* 267 (C, F, G, MBG, S); Sanford, Florida, Aug. 1922, *Rapp* (NY); Bowling Green, Kentucky, Aug. 1899, *S. F. Price* (MBG); Hubbardston, Michigan, coll. of 1876, *C. F. Wheeler* (P); roadside hedge, Stark Co., Illinois, Aug. 4, 1907, *Chase* 1534 (US); Ames, Iowa, Aug. 26, 1896, *Pammell & Combes* 203 (F, G, MBG, NY, US); Bear Creek bottoms, Hannibal, Missouri, Sept. 3, 1913, *Davis* 1336 (MBG); near Page, Leflore Co., Oklahoma, Sept. 27, 1914, *Blakley* 3415 (MBG); Lake Charles, Louisiana, Sept. 1906, *Cocks* 3213 (G); vicinity of Santa Fe, New Mexico, Oct. 3, 1913, *Rose & Fitch* 17688 (NY, US); Great Falls, Montana, coll. of 1889, *F. W. Anderson* (F); Murray, Salt Lake Co., Utah, Sept. 21, 1916, *W. W. Jones* 231 (G); Elko, Nevada, Aug. 11, 1918, *Abrams* 7249 (S); about old cellar on Court St., Salem, Oregon, July 30, 1923, *J. C. Nelson* 4903 (PA); Beckwith, Sierra Co., California, July, 1903, *Hall & Babcock* 4462 (C).

BERMUDA: garden, Mangrove Park, Aug. 1913, *Brown & Britton* 1729 (NY, PA).

There are several horticultural varieties of this species, a good treatment of which may be found in Bailey's *Cyclopedia of Horticulture*.

2. *L. Morongii* Britton, Ann. N. Y. Acad. Sci. 7: 180. 1892.  
Pl. 14, figs. 1-3.

*L. Morongii* Brit. var. *typicum* Hassler, Fed. Rep. Spec. Nov. 15: 241. 1918.

A sparingly branched, spreading, spiny, glabrate shrub or small tree 1–4 m. tall; branches stout, densely leafy and floriferous, with few to many very stout spines 10–15 mm. long, tan to dark gray; leaves borne in fascicles of 1–5, blades usually ovate, sometimes very broadly so, 3–6 cm. long, 1.5–4 cm. broad, veins plainly visible beneath, apex acute to obtuse, margins undulate, entire or minutely crenulate, base tapering to a petiole 5–15 mm. long; flowers borne in glomerules of 5–20 at the nodes, frequently densely aggregated on short lateral or terminal branchlets, nodes with dense gray tomentum, pedicels 1–3 mm. long; calyx campanulate, 1.5–2.5 mm. long,  $\frac{2}{3}$  as broad, glabrate, except for small tuft of hairs on the tips of the four broadly triangular lobes, these half as long as the tube, or less; corolla infundibuliform, whitish, tube 3–4 mm. long, 2–2.5 mm. wide at summit, about 1 mm. wide at base, glabrous exteriorly, lobes 4, ovate,  $\frac{1}{2}$ – $\frac{2}{3}$  as long as tube, spreading, their margins ciliate; stamens about equal to corolla-lobes, hence slightly exserted, filaments adnate to slightly more than 1 mm. from base of corolla-tube, densely hairy for nearly 2 mm. from point of adnation, adjacent corolla-tube also hairy above and below base of filaments, anthers 1 mm. or less long; style usually slightly exceeding stamens; berry globose, 2.5–3.5 mm. in diameter, several-seeded.

Type: Asuncion, central Paraguay, 1888–90, *Morong* 161 (NY).

Distribution: central Paraguay westward to the Territory of Chaco, Argentina.

Material seen:

PARAGUAY: L'Assomption, May 20, 1884, *Balansa* 4096 (D); near Concepcion, Aug. 1901–02, *Hassler* 7201 (D, KEW, V); Conception de Paraguay, Nov. 1892, *Kuntze* (NY); northern Paraguay, Nov. 1892, *Kuntze* (NY); Asuncion, central Paraguay, coll. of 1888–90, *Morong* 161 (G, MBG, NY TYPE, PA, US).

ARGENTINA: Terr. de Los Misiones, Posadas, Apr. 9, 1930, *Rodriguez* 166 (MBG); Territorio del Chaco, *Jørgensen* 2208 (G, MBG).

The writer has not seen either of the two plants cited by Hassler, Fed. Rep. Spec. Nov. 15: 241. 1918, under his *L. Morongii* var. *indutum* (*Hassler* 2669, 7201) which was characterized as follows: "Rami sparse, folia supra et subtus, petioli dense pilis simplicibus

viscidulis, induti, pulvinuli albicanti-tomentosuli." Therefore, it is considered wisest to treat these plants as a valid variety until there is opportunity to study some material which may be considered as authentic.

2a. *L. Morongii* Brit. forma *parvifolium* C. L. Hitchcock, f. nov.<sup>40</sup>

Leaves rhombic-ovate, 1-2 cm. long, 0.8-1.2 cm. broad, thicker than those of the species.

Type: "El Charco," Prov. Santiago del Estero, Argentina, Feb. 15, 1930, alt. 300 m., *Venturi 10105* (MBG); Tucuman, Dec. 19, 1913, *Rodriguez 1192* (MBG).

The pubescence and the characters of the corolla are as in the species, but the leaves are much smaller and more leathery in texture.

3. *L. cuneatum* U. Dammer in Engl. Bot. Jahrb. 37: 169. 1905.  
Pl. 14, figs. 17-19.

*L. pruinosum* var. *puberulum* Griseb. Abhandl. König. Ges. Wiss. Gött. (Symb. Fl. Arg.) 24: 245. 1879.

*L. colorans* U. Dammer, Meded. Rijks Herb. Leid. 29: 22. 1916.

A densely pubescent, well-armed shrub 2-3 m. tall; branches spreading, armed with slender, needle-like spines 5-12 mm. long, young branches densely lanate with branched hairs, tardily glabrate and tan in age; leaves borne singly or in 2's, blades broadly ovate or nearly rotund to oblong or obovate, 1-3 cm. long, 0.8-2.4 cm. broad, floccose with much-branched hairs, young leaves cinereous, apex rounded or obtuse, less commonly acute, margins entire, sometimes undulate, rounded to cuneate at base; petioles 0.3-2 cm. long, densely lanate; flowers borne in glomerules of 5-15 at the nodes, nearly sessile, pedicels 1-2 mm. long; calyx 1.5-2 mm. long, about as broad, sparingly pubescent, irregularly 4- or 5-lobed, frequently 2-lipped, the lobes  $\frac{1}{3}$ - $\frac{1}{2}$  as long as the tube, their margins rather conspicuously short lanate-ciliate with simple and branched hairs; corolla infundibuliform, tubular por-

"*L. Morongii* Brit. forma *parvifolium* C. L. Hitchcock, f. nov.; foliis rhombo-ovatis, 1-2 cm. longis, 0.8-1.2 cm. latis. "El Charco," Prov. Santiago del Estero, Argentina, Feb. 15, 1930, alt. 300 m., *Venturi 10105* (Missouri Botanical Garden Herbarium, no. 986382, TYPE).

tion about 4 mm. long, 3 mm. in diameter at summit, 1.25–1.75 mm. in diameter above ovary and at base, glabrous without, lobes 4 or 5, oblong-oval, 1.5–2 mm. long, spreading or revolute; stamens 4 or 5, exserted 1–2 mm. from corolla-tube, filaments subequal, adnate to about 1.5 mm. above base of corolla-tube, densely lanate the first 2–2.5 mm. of their length, adjacent corolla-tube also conspicuously pubescent above and below point of filament adnation, anthers 1.25 mm. long, thecae attached to connective near their middle; style equal to or slightly longer than stamens; berry several-seeded, disc evident.

Type: Caiza, Gran Chaco, Bolivia, in campo aprico, March 20, 1902, *Fries 1430* (ST).

Distribution: apparently known only from the region of Gran Chaco.

Material seen:

BOLIVIA: Caiza, in campo aprico, March 20, 1902, *Fries 1430* (ST TYPE); im Kamp des linken Pilcomayo-Ufers, Dec. 14, 1910, *Herzog 1097* (ST TYPE *L. colorans*, D, V); photograph of TYPE collection at Berlin (G).

ARGENTINA: Oran, Urundel, Prov. Salta, Dec. 1, 1913, *Rodriguez 1145* (MBG); Pasaje del Rio Juramento, Prov. Salta, Feb. 21, 1873, *Lorentz & Hieronymus 363* (NY, US); Salta, Oran, Rio Piedras, Nov. 5, 1911, *Rodriguez 176* (MBG); Salta, Nov. 1877, *Lorentz & Grisebach* (KEW); Quebrada de San Lorenzo, Prov. Salta, Oct. 23, 1925, *Schreiter 94* (MBG); Jujuy, coll. of 1913, *Schuel 28 & 124* (V).

*Lycium cuneatum* resembles *L. Morongii* very closely in habit and flower characters, the differences being that *L. cuneatum* has dense pubescence, broadly ovate leaves, and apparently a shorter calyx and somewhat broader corolla. *Lycium colorans* cannot be given any nomenclatural recognition, as the pubescence and flower characters are identical with *L. cuneatum*; in fact the only difference in the two plants is that *L. colorans* is slightly more cinereous and the leaves are more nearly rotund.

4. *L. Martii* Sendtner in Mart. Fl. Bras. 10: 154. 1846; Dunal in DC. Prodr. 13<sup>1</sup>: 512. 1852. Pl. 14, figs. 4–6.

*L. Martii*  $\alpha$  *normale* Terrac. Malpighia 4: 534. 1891.

A sparingly branched, armed, sparsely pubescent shrub 2-3 m. tall; branches slender, very leafy, armed with few sharp spines 6-10 mm. long, reddish-brown, densely hirtellous and grayish on young parts, glabrate with age; leaves borne singly or in 2's or 3's, blades ovate, elliptic, or obovate, 3-5 cm. long, 1-2.5 cm. broad, thin, sparsely pubescent with simple or branched hairs on veins, apex acute to obtuse, margins entire, base cuneate-attenuate to a petiole 8-15 mm. long, the petioles more densely pubescent; flowers borne in glomerules of 2-7 on pedicels about 3 mm. long; calyx campanulate, 1.5-2 mm. long, slightly broader, tube glabrous, irregularly 4-8-lobed, the lobes very short, with sparsely ciliate margins; corolla infundibuliform, tubular portion 4-4.5 mm. long, about 3.5 mm. in diameter at apex, 2 mm. in diameter at base, glabrous exteriorly, lobes 5, spreading or deflexed, oblong-ovate, about 2 mm. long, their margins ciliate; stamens 5, about equal to corolla-lobes, exserted from tube about 2 mm., filaments adnate to about 1 mm. or less from base of corolla, densely lanate for the first 3 mm. of their length, adjacent corolla-tube also pubescent, anthers 1 mm. long; berry ovoid, about 4 mm. long, 6-10-seeded.

Type: on the San Francisco River near Joazeiro, Prov. Bahia, Brazil, May, 1818, *Martius* 2287 (probably at Munich).<sup>41</sup>

Distribution: northeastern Brazil, from the Province of Ceará to the Province of Bahia.

Material seen:

BRAZIL: Caminho Limoeiro, Prov. Ceará, Apr. 14, 1910, *Löfgren* 749 (ST); Vargem, Prov. Ceará, Apr. 12, 1910, *Löfgren* 523 (ST); Arneiroz, Prov. Ceará, Apr. 8, 1910, *Löfgren* 487 (ST).

The above description was drawn from material labelled "L. *Martii*" by R. E. Fries. These plants fit Sendtner's description perfectly, and they are almost certainly his species. As here described, *L. Martii* is very similar to *L. Morongii*; the five-lobed corolla of the former is probably not constant, and the same opinion may be hazarded for the four-lobed condition in *L.*

<sup>41</sup> Since the above statement was written, a photograph of the type specimen of *Lycium Martii* Sendt., namely, *Martius* no. 2287, in the Herbarium of the Botanical Museum at Munich, was received through the kindness of Dr. Karl Suessenguth. The photograph, now deposited in the Missouri Botanical Garden Herbarium, verifies in all details the writer's interpretation of this species.

*Morongii*. Aside from this character, it appears that the corolla of Sendtner's species is broader and less constricted above the ovary, and that the filaments are inserted lower on the corolla-tube than in Britton's species. However, the writer feels that it is altogether probable that *L. Morongii* and possibly *L. cuneatum* will be found to be conspecific with *L. Martii* when there is enough material available that one may obtain a clear idea of the range of variation within the species. Until such time it is considered best to treat them as three very closely related species.

5. *L. glomeratum* Sendtner in Mart. Fl. Bras. 10: 154. 1846; Dunal in DC. Prodr. 13<sup>1</sup>: 512. 1852; Miers, Ann. & Mag. Nat. Hist. II, 14: 139. 1854, and Ill. S. Amer. Pl. 2: 115, pl. 68F. 1857.

Pl. 14, figs. 7-9.

*L. glomeratum* var. *obovatum* Miers, Ann. & Mag. Nat. Hist. II, 14: 139. 1854, and Ill. S. Amer. Pl. 2: 115. 1857.

*L. Martii*  $\beta$  *glomeratum* Terrac. Malpighia 4: 534. 1891.

*L. Martii*  $\beta$  *glomeratum* var. *obovatum* (Miers) Terrac. l. c.

A very leafy, glabrous shrub or small tree, usually unarmed, but spines sometimes present in leaf-fascicles; branches long, apparently spreading, slender but not flexuous, tan to reddish; leaves 1-5 at the nodes, obovate to lance-ovate or ovate, 2-8 cm. long, 1-3 cm. broad, rounded to acute at apex, rounded to cuneate at base, with petiole 3-10 mm. long, glabrous, or less commonly, minutely and sparsely pubescent, margins entire, midnerve and lateral nerves evident; flowers borne in small glomerules of 5-20 at the nodes, pedicels 2-5 mm. long; calyx campanulate, 2-2.5 mm. long, about as wide, irregularly 3-6-lobed, the lobes triangular,  $\frac{1}{2}$  as long to equal to tube, their margins sparsely ciliate to minutely lanate-ciliate; corolla infundibuliform, tubular portion 4.5-5.5 mm. long, much narrowed for nearly  $\frac{1}{2}$  its length, then greatly expanded, about 1 mm. in diameter at base, slightly less above ovary, 2.5 mm. at summit, sparsely to densely pubescent externally for  $\frac{1}{3}$  its length; lobes (4?) 5, ovate, 2-2.5 mm. long, spreading, their margins ciliate, stamens about equal to corolla-lobes, thus usually exserted, filaments subequal, adnate to 1-1.5 mm. from base of corolla-tube, densely pilose from base to top of corolla-tube, adjacent corolla-tube also pubescent, but less

densely so, anthers about 1 mm. long; style equalling or slightly exceeding the stamens; berry ovoid, 3-5 mm. in diameter, 30-50-seeded.

Type: in Prov. Alagoas, Brazil, April, 1839, *Gardner 1870* (probably at Munich).

Distribution: from eastern coast of Brazil to Bolivia and western Argentina, along the rivers of the interior.

Material seen:

BRAZIL: without locality, *Burchell 8967* (KEW); Ilha de San Pedro, near mouth of San Francisco R., Prov. Alagoas, coll. of 1838 *Gardner*, TYPE collection *L. glomeratum* var. *ovovatum* (KEW); Prov. Alagoas, Apr. 1839, *Gardner 1870*, TYPE collection (D, KEW, NY, US, V).

BOLIVIA: Gran Chaco, Tatarenda, in margine silva, loco aprico, Oct. 17, 1902, *Fries 1885* (ST).

PARAGUAY: Berges du Rio-Paraguay à l'Assomption, Apr. 18, 1842, *Balansa 2082* (KEW, ST).

URUGUAY: Montevideo, May, 1867, *Gibert 6411* (KEW).

ARGENTINA: Terr. de Misiones, Santa Ana, Feb. 10, 1913, *Rodriguez 762* (MBG); Salado, Puente Mihura, June, 1930, *Jurado* (MBG); Reconquista, March 24, 1904, *Venturi 203* (MBG); Ciudad Corrientes, Oct. 10, 1922, *Escuela Centenario 77* (MBG).

Due to the extreme variation in leaf shape in this species it does not seem wise to recognize Miers' variety *ovovatum*, as the leaves on that plant vary from obovate to elliptic and oblong-ovate.

6. *L. cestroides* Schlecht. *Linnaea* 7: 70. 1832; *Mart. Fl. Bras.* 10: 155. 1846; *Hieron. Bol. Acad. Cienc. Cord.* 2: 41, *pl. 2, figs. 12-13.* 1876; *Griseb. Abhandl. König. Ges. Wiss. Gött.* 19: 217. 1874 (*Pl. Lorent.* 169. 1874), and 24: 245. 1879; *Miers, Ann. & Mag. Nat. Hist. II,* 14: 134. 1854, and *Ill. S. Amer. Pl.* 2: 110, *pl. 67F.* 1857. *Pl. 16, figs. 13-15.*

*Acristus cestroides* Miers, *Hook. Lond. Jour. Bot.* 4: 343. 1845, and *Ill. S. Amer. Pl.* 1: 23. 1850; *Dunal in DC. Prodr.* 13<sup>1</sup>: 500. 1852.

*L. cestroides*  $\alpha$  *normale* *Terrac. Malpighia* 4: 534. 1891.

A shrub or small tree 1–5 m. tall; branches slender and somewhat flexuous, unarmed or with few spines toward ends, greenish-yellow, covered with dense soft pubescence when young, tardily glabrate with age; leaves sometimes borne singly on young branches, more commonly in fascicles of 2–6, the inner ones much reduced, blades ovate to ovate-lanceolate, less commonly nearly elliptic, 1.5–7 cm. long, 0.5–3.5 cm. broad, acute to acuminate, rounded or tapering gradually to a distinct petiole 3–12 mm. long, densely pubescent when young, glabrate in age, pubescence persistent on petioles; flowers borne singly or in fascicles of 2–6 at the nodes or on short lateral branchlets 1–6 cm. long, these usually with internodes very much shortened, the flowers thus often densely aggregated; pedicels 2–9 mm. long, densely puberulent; calyx tubular-campanulate, 3–5 mm. long, 2–3 mm. in diameter, 5-lobed, these triangular-acuminate, 1–2 mm. long, sparsely puberulent, margins densely white-lanate-ciliate; corolla blue to dark purple, 14–20 mm. long, including the lobes, 2–3 mm. in diameter at summit, 1.5 mm. at base, glabrous without, lobes 5, ovate, spreading, 1.5–2 mm. long, their margins densely white-lanate-ciliate; stamens 5, adnate to about middle of corolla-tube or slightly below, filaments unequal, 2 about equalling corolla-tube, 1 only half as long, other 2 intermediate in length, pilose at base for about 1 mm., corolla-tube somewhat hairy above adnate portion of filaments, anthers 1–1.5 mm. long; style slightly longer or shorter than the shortest stamens; berry globose or ovoid, 5–7 mm. long, 3–5 mm. in diameter when ripe, with 10–20 seeds.

Type: "In Brasilia meridionalis prope San Jose, Uruguay," *Sellow* (probably at Berlin).

Distribution: central Argentina, from Buenos Aires north to Bolivia and east to Uruguay.

Material seen:

BRAZIL: without locality, *Sellow* (KEW, ST, V), probably TYPE collection and therefore from Uruguay.

URUGUAY: San Jose de Uruguay, Brasil, *Sellow* (G, photograph of TYPE at Berlin); Atahualpa, Dept. Montevideo, Rep.-Oriental del Uruguay, Nov. 1925, alt. 30–40 m., *Herter* 279 (C, D, F, G, MBG, NY, ST); Montevideo, June, 1867, *Gibert* 18 (KEW);

vicinity of the city of Montevideo, June 22-23, 1882, *Ball* (G, NY); Miguelete, Montevideo, May, 1927, *Herter* 279a (US).

BOLIVIA: Tarija, locis apricis, Jan. 16, 1902, *Fries* 1032 (ST).

ARGENTINA: Arroyo del Medio, loco aprico in margine silva, Prov. Jujuy, June 29, 1901, *Fries* 351 (ST); Prov. Jujuy, coll. of 1913, *Schuel* 72 (V); Alesnancia, Prov. Salta, Dept. Guachipas, Nov. 4, 1929, *Venturi* 9816 (MBG, ST); Agua Caliente, Prov. Salta, Dept. Candelaria, Oct. 30, 1927, *Venturi* 5431 (F); Capia, Prov. Tucuman, Dec. 23, 1911, *Rodriguez* 217 (MBG); circa Sta. Ana, Prov. Tucuman, Nov. 1902, *Baer* 73 (D); Prov. Tucuman, Oct. 12, 1923, alt. 750 m., *Venturi* 2549 (G, US); Villa Lujan, Prov. Tucuman, Dec. 1918, *Venturi* 24 (MBG); Tucuman, Nov. 1892, *Kuntze* (NY, US), *Tweedie* (V); in rocky places, Andalgala, Prov. Catamarca, Oct. 10, 1916, alt. 1070 m., *Jørgensen* 11511 (ST); Andalgala, Prov. Catamarca, Sept. 9, 1915, *Jørgensen* 970 (C, G, MBG, US); Balcogna, Prov. Catamarca, Dept. Alta, Jan. 14, 1928, alt. 1250 m., *Venturi* 7136 (F); Santiago del Estero (probably), coll. in 1836, *J. Tweedie* (KEW); "El Charco," Santiago del Estero, Feb. 13, 1930, alt. 300 m., *Venturi* 10115 (MBG, ST); Prov. Cordoba, Jan. 25, *Lossen* 81 (F, G, MBG); Cordoba, Dec. 1891, *Kuntze* (NY); Cordoba, pr. urbem, Oct. 26, 1877, *Hieronymus* (F); Cordoba, Oct. 6, 1877, *Hieronymus* (US); Cordoba, pr. urbem, Oct. 9, 1877, *Hieronymus* (F); Estancia Germanica prope Cordoba, June-Dec. 1874, *Lorentz* 32 (D, V); Prov. Cordoba, Rio Seballos, Dec. 8, 1876, *Hieronymus* (F, US); Sierra Chica de Cordoba, Rio Seballos, Dec. 8, 1876, *Hieronymus* 593 (D); Cordoba, March 3, 1880, *Galander* (NY); cerca Las Rosas, Prov. Cordoba, June 13, 1898, *Stuckert* 4936 (D); Casa Bamba, Sierra de Cordoba, Nov. 1899, *Stuckert* 7905 (D); La Plata, Prov. Buenos Aires, *Parodi* 8702 (G); parks, gardens, and environs of city of Buenos Aires, June, 1913, *Curran* 103 (US); Rivadavia, *Molfino* (MBG).

Superficially, this species resembles *Cestrum* more than it does *Lycium*, but it has a well-coiled embryo, and must be placed in this genus. Because of the fact that the nodes are so closely approximated in some instances that the flowers appear to be borne in glomerules, Miers placed the species in the genus *Acnistus*, but later realized his mistake.

Hieronymus, Bol. Acad. Cienc. Cord. 2: 43, *pl. 2, figs. 1-8.* 1876, described what he considered to be a hybrid between *L. cestroides* and *L. argentinum* (*ciliatum*) from "Chacra Germania de la Merced," near Cordoba, Argentina. Material labelled *L. arg. × cestroides* in his handwriting, taken from that locality in 1871 and in 1876, answers his description and plate well, and it is safe to assume that it is part of the material with which he worked. An examination of the pollen shows that about 40 per cent of it is abortive. Aside from this evidence, the plants combine characters of the two species, as shown by plate 19, figs. 10-12. A summary of the evidence will show why the author considers that Hieronymus was correct in his deductions.

Leaves—much like those of *L. cestroides*.

Pubescence—much like that of *L. cestroides*.

Flowers—borne singly or in 2's as in *L. ciliatum*.

Calyx—tube like that of *L. cestroides*, lobes between those of the two species, not lanate-margined, but like those of *L. ciliatum*.

Corolla—tube between the two, much longer than in *L. ciliatum*, much more expanded than in *L. cestroides*; lobes intermediate in size; margins as in *L. ciliatum*, base of tube pubescent as in *L. ciliatum*, but not nearly so much so; filaments like those of *L. cestroides* (not glandular fringed), but slightly more pilose and less adnate to the corolla-tube, about the same degree of adnation, proportionately, as in *L. ciliatum*, more nearly equal than in *L. cestroides*; stigma about same length, proportionally, as in *L. ciliatum* (much longer than in *L. cestroides*).

Those collections which are considered to be of such a hybrid nature are:

ARGENTINA: Chacra de la Merced bei Cordoba, Oct. 17, 1875, *Hieronymus* 493 (F, NY, US), and Oct. 11, 1881 (D); Cordoba, Nov. 1875, *Hieronymus* (C, F, G, NY, US, V); Provincia de Cordoba, Chacra de la Merced, Oct. 1871, *Hieronymus* (NY); Cordoba, coll. of 1873, *Lorentz & Hieronymus* (NY); Chacra de la Merced, near the city of Cordoba, coll. of 1876-77, *Hieronymus* (D, F, KEW, US); Cordoba, Sept. 1876, *Hieronymus* (V).

7. *L. cyathiformum* C. L. Hitchcock, sp. nov.<sup>42</sup>

Pl. 14, figs. 32-34; pl. 20.

A spreading, pubescent, sparingly armed shrub 2-3 m. tall; branches slender, very leafy, spines few, 5-10 mm. long, densely pubescent with branched hairs, tardily glabrous, tan or grayish; leaves ovate to ovate-lanceolate, oblong, or rounded, 3-5 in a fascicle, blades 1.5-5 cm. long, 1-3 cm. broad, sparsely pubescent with branched hairs, the veins and margins more densely pubescent, apex acuminate to rounded, entire, base rounded to a 5-12 mm. long, very densely dichotomously branched-pubescent petiole; flowers borne singly or in groups of 2-5 at the nodes, pedicels 3-7 mm. long, densely pubescent; calyx cup-shaped, pubescent with branched hairs, 3-4 mm. long, 2-2.5 mm. wide, irregularly 4-5-lobed, sometimes cleft to middle on one side, the lobes acute, 1-1.5 mm. long, their margins lanate-ciliate; corolla infundibuliform-cyathiform, tubular portion 7-10 mm. long, 2.5-3.5 mm. in diameter at the top, 1.5 mm. in diameter at the base, contracted slightly above ovary, glabrous without, lobes 5, oblong-rounded, 1.5 mm. long, spreading, their margins densely tawny-lanate-ciliate; stamens partially exserted, filaments subequal, about equaling corolla-tube, adnate to about  $\frac{1}{3}$  the length of the corolla-tube, densely hairy for first 2 mm. of their length, adjacent corolla-tube also pubescent above and below region of adnation of filaments, anthers 1.25 mm. long; style slightly longer than stamens, about equal to corolla-lobes; berry ovoid, 6-8 mm. long, several-seeded.

Type: Gran Chaco, Bolivia, "Tatarenda in loco aprico in dumetis, March 26, 1902," Fries 1473 (ST).

Distribution: region of Gran Chaco.

<sup>42</sup> *L. cyathiformum* C. L. Hitchcock, sp. nov., fruticosum, pubescentissimum glandulosumque, spinosum, 2-3 m. altum; ramis gracilibus, foliosissimis; foliis ovatis, ovato-lanceolatis vel oblongis, 3-5-fasciculatis, laminis 1.5-5 cm. longis, 1-3 cm. latis, semi-stellato-pubescentibus; floribus solitariis vel 2-5-fasciculatis, pedicellis, 3-7 mm. longis; calyce campanulato, 3-4 mm. longo, 2-2.5 mm. lato, 4-5-fido, lobis 1-1.5 mm. longis; corolla infundibuliformi-cyathiforma, tube 7-10 mm. longo, ad verticem 2.5-3.5 mm. in diametro, ad basem 1.5 mm. in diametro, externo glabro, 5-fido, lobis oblongo-rotundis, 1.5 mm. longis, marginibus lanato-ciliatis; staminibus corollae tubi partem medianam adhaerentibus, basi corollae intraque villosis; stylo corollae lobis subaequale; bacca 6-8 mm. longa, plurisperma. Collected at Gran Chaco, Bolivia, "Tatarenda in loco aprico in dumetis, March 26, 1902," Fries 1473 (Stockholm Botanical Museum, TYPE).

Material seen: TYPE collection, and one specimen labelled "Sandy places, Pampas," June 1864, Pearce (KEW), either from northern Argentina or from Peru.

8. *L. vimineum* Miers, Ann. & Mag. Nat. Hist. II, 14: 140. 1854, and Ill. S. Amer. Pl. 2: 116, pl. 69B. 1857.

Pl. 14, figs. 10-12.

*L. chilense* γ *implexum* var. *vimineum* (Miers) Terrac. Malpighia 4: 530. 1891.

A partially scandent, glabrate shrub 3-7 m. tall; branches very slender, flexuous and apparently recurved or drooping, armed with few very sharp spines about 5 mm. long, tan; leaves linear-lanceolate to narrowly oblong-ob lanceolate, 15-30 mm. long, 2-5 mm. broad (probably larger on old branches), acute, glabrous, 1-3 in a fascicle; flowers 1-3 in a fascicle, pedicels about 4 mm. long; calyx cup-shaped, 2.5-3 mm. long, 2-3 mm. in diameter, glabrous except for the ciliate margins of the 4 triangular lobes 1 mm. long; corolla broadly tubular-obconic, constricted somewhat above ovary, tubular portion 4-5 mm. long, 3 mm. in diameter at summit, glabrous exteriorly, lobes 4 (5?), ovate-cuneate, 2-2.5 mm. long, spreading, their margins conspicuously ciliate; stamens 4, equal to corolla-lobes, thus exserted 2-3 mm. when lobes spread, filaments adnate to a little below the middle of the corolla-tube, subequal, densely woolly-pilose for about 1 mm. just above the glabrous base, adjacent corolla-tube also densely pubescent, anthers 1.5 mm. long; style "equal to stamens," or exceeding them 1-2 mm.; berry unknown.

Type: near the town of Santa Fe, Province of Santa Fe, Argentina, Tweedie (British Museum).

Distribution: known only from the type locality.

Material seen: near town of Santa Fe, Prov. Santa Fe, J. Tweedie (KEW TYPE collection); Santa Fe, Rio Parana, March, 1923, Hauman (MBG); Santa Fe, desembocadura del Salado, Apr. 1920, Molfino (MBG).

This species suggests *L. chilense* at first glance, but is quite distinct from that species; the filaments are not glandular at the base, and the corolla is glabrous exteriorly. Tweedie's label reads "This is a shrub 12 to 20 feet high, very plentiful near the town of Sta.

Fea," but since the material obtained by him consisted of snips from the ends of the branches, the foregoing description was of necessity drawn up by inference as far as the habit of the plant is concerned.

9. *L. nodosum* Miers, Ann. & Mag. Nat. Hist. II, 14: 139. 1854, and Ill. S. Amer. Pl. 2: 115, pl. 69A. 1857. Pl. 15, figs. 16-18.

*L. chilense* Miers ex Bert. var. *heterophyllum* Hassler, Fed. Rep. Spec. Nov. 15: 240. 1918, as to specimen cited.

*L. chilense* var. *implexum* var. *nodosum* (Miers) Terrac. Malpighia 4: 530. 1891.

An open, somewhat scandent, glabrate shrub, unarmed, or with few spines, 1-3 m. tall; branches long, slender, flexuous, silvery-gray; leaves 1-3 in a fascicle, blades spatulate to oblong-elliptic or broadly ovate, 5-10 (25) mm. long, 3-5 (10) mm. broad, very thin in texture, rounded or obtuse, tapering to a petiole 2-5 mm. long, nodes usually rather close together; flowers borne singly, pedicels 3-5 mm. long, glabrous; calyx 1-1.5 (2) mm. long, 4 (5)-lobed, the lobes about  $\frac{1}{3}$  length of tube, acute, their margins sparsely ciliate, rest of calyx glabrous; corolla tubular-campanulate, the tube 4-5 mm. long, 2.5 mm. in diameter at summit, 1 mm. or slightly more at base, glabrous without, lobes 4 (5), oblong-ovate, 1.5-2 mm. long, minutely ciliate, spreading, or, more commonly, reflexed with tips revolute; stamens usually exserted 2.5-3.5 mm. due to spreading of corolla-lobes, filaments somewhat subequal, one usually a little shorter than others, adnate to approximately  $\frac{1}{3}$  way from base of corolla-tube, glabrous for  $\frac{1}{2}$  mm. from base, densely clothed with branched hairs for about 1 mm. above this point, adjacent corolla-tube also pubescent; style equal to or as much as 1 mm. longer than stamens; berry ovoid, 5-6 mm. long, red, many-seeded.

Type: Tucuman, Argentina, Tweedie (British Museum).

Distribution: northern Argentina, from the Province of Tucuman northward and eastward to the region of the Gran Chaco in Bolivia and Paraguay.

Material seen:

BOLIVIA: in regione cursus inferioris fluminis Pilcomayo, Aug. 1906, Rojas 504 (KEW, V); Gran Chaco, Colonia Creveaux (Rio

Pilcomayo), in campo uliginoso, Apr. 18, 1902, *Fries* 1652 (ST).

PARAGUAY: Puerto, Gran Chaco in silvis, May 14, 1895, *Anisits* 2186 (ST).

ARGENTINA: La Fidelidad, Terr. Chaco, Apr. 1898, *Jörgensen* 2825 (G, MBG, US); Prov. Tucuman, *J. Tweedie* (KEW, TYPE collection); Chafar Pozo, Tucuman, Dec. 1919, *Venturi* 708 (MBG); Formosa, La Fidelidad, Apr. 1918, *Jörgensen* 2825 (MBG).

*L. nodosum* is most closely related to *L. Tweedianum*, from which it differs in habit, in having more slender branches with fewer spines, and in having a calyx only half as large; moreover, the corolla is shorter and the stamens are more exserted in proportion to the corolla length. Where the two species overlap in the region of the Gran Chaco, it is difficult to distinguish them, as they appear to intergrade; however, the two species are so strikingly different in general aspect and corolla character that it seems certain they are distinct. *L. nodosum* differs from *L. vimineum* in that its calyx is much smaller, and the corolla-tube is only half as broad.

10. *L. Tweedianum* Griseb. Abhandl. König. Ges. Wiss. Gött. 19: 216. 1874 (Pl. Lorent. 168. 1874), and 24: 245. 1879.

Pl. 15, figs. 1-3.

*L. Tweedianum* Griseb. var. *pruinosum* (Griseb. ?) Hassler, Ann. Cons. et Jard. Bot. Genève 20: 188. 1917.

*L. paucifolium* Rusby, Mem. Torr. Bot. Club 6: 91. 1896.

*L. confusum* U. Dammer, Arkiv f. Bot. 1: 404. 1903.

*L. subtridentatum* U. Dammer, Meded. Rijks Herb. Leid. 29: 25. 1916.

*Grabowskia Schlechtendalii* as treated by Chodat, Bull. Soc. Bot. Genève II, 8: 150. 1916, as to citation of specimen.

*L. Johnstonii* Blake, Contr. Gray Herb. N. S. 53: 49. 1918.

*L. infaustum* Miers acc. to Griseb. Abhandl. König. Ges. Wiss. Gött. 19: 217. 1874 (Pl. Lorent. 169. 1874).

*L. salsum* Ruiz & Pavon, as treated by Miers, Ann. & Mag. Nat. Hist. II, 14: 337. 1854, and Ill. S. Amer. Pl. 2: 131, pl. 72c. 1857; Johnston, Proc. Bost. Soc. Nat. Hist. 34: 243. 1909.

A slender, spiny, somewhat branched, glabrate shrub 1-3 (5) m. tall; branches slender, somewhat flexuous, armed chiefly by

the pungent short branchlets, grayish-tan, somewhat lustrous; leaves glabrous, 1-5 in a fascicle, spatulate to oblong-obovate, 7-25 mm. long, 2-15 mm. broad, apex rounded (acute), base tapering to a short petiole, midnerve evident; flowers few, on very slender pedicels 4-15 mm. long, borne singly at the nodes; calyx cup-shaped, 2.5-4 mm. long,  $\frac{2}{3}$  as broad, 4 (5)-lobed, the lobes irregular,  $\frac{1}{6}$ - $\frac{1}{3}$  the length of the tube, sparsely ciliate, otherwise glabrous; corolla narrowly tubular-obconic, constricted above ovary, flared at summit, tube 4.5-6.5 mm. long, about 2.5 mm. in diameter at summit, glabrous, lobes 4 or 5, oblong-ovate, 3-3.5 mm. long, spreading, more or less ciliate; stamens 4 or 5, exserted 3-4 mm. due to spreading of corolla-lobes, filaments subequal or equal, about equalling corolla-lobes, adnate to near the middle of the corolla-tube or slightly above, glabrous at base, but densely pubescent with branched hairs just above the free bases, adjacent corolla-tube also pubescent, anthers 1-1.5 mm. long; style equaling or slightly longer than the stamens; berry red, black with age, ovoid or subglobose, 6 mm. long, 15-25-seeded.

Type: between Rio Saladillo and Santiago del Estero, Argentina, December, 1871, *Lorentz*.

Distribution: from the region of Santiago del Estero, Argentina, along the Pilcomayo River in Bolivia, westward to Peru, and along the coast of Peru, Ecuador, Colombia, and Venezuela.

Material seen:

ARGENTINA: entre al Rio Saladillo y Santiago del Estero, Dec. 1871, *Lorentz* (MBG, photograph of TYPE); Santiago del Estero, Nov. 1877, *Lorentz & Grisebach* (KEW); Quinta, pr. Laguna de la Brea, in solo aprico salso, Prov. Jujuy, June 19, 1901, *Fries 200* (ST TYPE *L. confusum*); Chañar Pozo, Tucuman, Oct. 1919, *Venturi 438* (MBG).

PARAGUAY: Gran Chaco, Santa Elisa, lat. 23° 10' S, Dec. 1903, *Rojas 2637* (D, KEW, V TYPE collection *L. Tweedianum* var. *pruinosum*); Gran Chaco, Santa Elisa, lat. 23° 10' S, Dec. 1903, *Rojas 2707* (D, KEW, V, leaves unusually large, but apparently this species, surely not *L. Martii* as labelled); Pilcomayo R., coll. of 1888-90, *Morong 1006* (G, MBG, NY, PA, US); Gran Chaco, *Pride* (KEW).

BOLIVIA: im Kamp des linken Pilcomayo-Ufers, Nov. 15, 1910,

Herzog 1095 (ST TYPE *L. subtridentatum*, D, V, photographs of the TYPE collection at Berlin are at MBG and G); Bolivian Plateau, coll. of 1891, Bang 1098, TYPE collection of *L. paucifolium* (F, G, MBG, NY TYPE, PA, US, V).

PERU: San Juan, coll. of 1871, *H. Anderson* (KEW); Valley of Lurin and Pachamac, Mathews 450, cited by Miers as *L. salsum* (G, KEW); near Lima, coll. of 1862, *Nation* (KEW); Lima, Wilkes Expl. Exped. (US); without definite locality, *Pavon*, coll. of 1826 (D).

ECUADOR: Prov. Oro, between Machala and Puerto Bolivar, Aug. 26, 1923, alt. 0-10 m., Hitchcock 21111 (NY); Chanduy, Prov. Guayas, in litore Maris Pacificis, Spruce 6505 (D, ST, V); Guayaquil, coll. of 1841, Hinds (KEW); Prov. Manabi, lat.  $\frac{1}{2}^{\circ}$  S, July 22, 1893, Eggers 14964 (F, KEW, US).

COLOMBIA: Sevillana, near Cienega, Dept. Magdalena, June 14, 1927, Salt (G, US); around Rio Frio, between the Cienega de Santa Marta and foothills, Dept. Magdalena, June 22-30, alt. 0-100 m., Pittier 1604 (US); near Papare, Santa Marta, Nov. 2, 1898-1901, *H. H. Smith* 448 (F, G, MBG, NY, PA, US).

VENEZUELA: between Coro and Alta Gracia, May 1, 1917, Curran & Haman 750, TYPE collection *L. Johnstonii* (G TYPE, NY, US); vicinity of Cabo Blanco, D. V., June 8, 1922, Pittier 10373 (D, US, Venez); Cabo Blanco, June 10, 1917, Curran & Haman 939 (G, NY, US); Vela de Coro, Apr. 1, 1917, Curran & Haman 447 (G, US); savannas of Barquisimeto, Lara, Sept. 1923, Saer 21 (US, Venez); Puerto-Cabello, June 24, 1917, Curran & Haman 1162 (G, US); among mangroves, Tucacas, July 19, 1923, Mell (NY); Cumana, July 3, 1917, Curran & Haman 1250 (G, NY); Is. of Coche, Aug. 5, 1903, *J. R. Johnston* 8 (G); El Valle, Is. of Margarita, Aug. 3, 1903, *J. R. Johnston* 61 (C, F, G, NY, P, V).

Grisebach's type has smaller leaves than most of the material included in this species, but it is identical with the other specimens cited in flower characters, whereas *L. confusum* and *L. subtridentatum* are unusual only because of their large leaves. Rusby's species was rightly called *L. paucifolium*, but there is good reason to suppose that the greater part of the leaves on his type have either been shaken off since the plant was collected, or that they

were shed before it was collected. *Lycium Johnstonii* might be considered an average form for this rather protean species. Hassler's variety *pruinosum* is a large-leaved form of the group, but is not at all similar to Grisebach's *L. pruinosum*, the latter a plant which must be referred to *Grabowskia*. Hassler's number 2637 (his variety *pruinosum*) is the one which Chodat erroneously referred to *Grabowskia*.

The writer has not been able to determine the exact identity of *L. salsum* Ruiz & Pavon, Fl. Peruv. 2: 46, pl. 183, fig. a. 1799. It is apparently conspecific with *L. Tweedianum*, but there is also a possibility that it is the same as *L. chilense*; however, the name *salsum* is preoccupied, since Bartram<sup>10</sup> described *L. salsum* from the southeastern United States in 1792. From Miers' plate and his citation, it is clear that the plant which he called *L. salsum* is this species.

*Lycium Tweedianum* has the most extended range of any of the species of the genus in the Western Hemisphere, remaining remarkably constant in flower characters throughout its range, whereas the leaves, on the other hand, show an unusual amount of variation. One well-marked variety is distinguishable in the West Indian Islands. It is interesting to note that Johnston's plant (number 61) from the Island of Margarita, Venezuela, is the best match for the type of any collection seen.

10a. *L. Tweedianum* Griseb. var. *chrysocarpum* (Urb. & Ekm.)

C. L. Hitchcock, comb. nov. Pl. 15, figs. 4-6.

*L. americanum* var. *chrysocarpum* Urb. & Ekm. Arkiv f. Bot. 22A<sup>10</sup>: 49. 1929.

*L. spathulifolium* Britton, Bull. N. Y. Bot. Gard. 3: 451. 1905.

Flowers somewhat smaller than in the species, calyx 1-2 mm. long; corolla-tube 4-5 mm. long; leaves 4-10 (20) mm. long, 1-2.5 mm. broad; otherwise as in the species.

Type: edge of mangrove, Juan-Lopez, Peninsula of Barahona, Prov. of Barahona, Santo Domingo, Haiti, July 23, 1926, Ekman 6729 (ST).

Distribution: West Indian Islands, principally Cuba, Haiti, and the Bahamas.

<sup>10</sup> Bartram, Trav. ed. 2, 57. 1792.

## Material seen:

WEST INDIAN ISLANDS: Trinidad, British W. Indies, rocky point west end of Monos Island, Apr. 4, 1921, *Britton, Britton & Brown* (NY); rocky plain near settlement, Anagada, *Britton & Fishlock* 1033 (NY, US); Republic of Haiti, Feb. 18, 1924, *Ekman* H955 (US); low arid wooded coastal region, vicinity of Etroite, Gonave Is., Haiti, March 15-21, 1920, *Leonard* 3345 (NY); Haiti, Plaine Cul de Sac, in the arid region at the foot of Marne a' Cabrets, July 18, 1924, *Ekman* 955 (ST); Azua, Santo Domingo, March 1913, *Rose, Fitch & Russell* 4017 (NY, US); am Yaque Fluss, Prov. Barahona, Santo Domingo, Haiti, Aug. 1910, alt. 50 m., *Fuertes* 547 (D, NY, US); Peninsula de Barahona, Prov. de Barahona, Santo Domingo, Haiti, Juan-Lopez, edge of mangroves, Aug. 23, 1926, *Ekman* 6728 (ST); vicinity of Port de Paix, Dec. 21-25, 1928, *Leonard & Leonard* 11047 (MBG); Peninsula de Barahona, Prov. de Barahona, Santo Domingo, Haiti, Juan-Lopez, edge of mangrove, Aug. 23, 1926, *Ekman* 6729 (ST TYPE); Novaliche, Cuba, Nov. 1918, *Hioram* 2273 (NY); near mouth of Yojo R., Cajabobo, Cuba, July 17-Aug. 4, 1924, *Leon* 12122 (NY); in tidewater-flats, Cannanera, Prov. Oriente, Cuba, Nov. 22, 1922, *Ekman* 15741 (ST); Quantanamo in fruticetis ad Glorieta, Prov. Oriente, Cuba, Oct. 22, 1919, *Ekman* 10236 (ST); Quantanamo in litor. mar., Prov. Oriente, Cuba, Sept. 25, 1914, *Ekman* 2925 (ST); Upper Savannah Inagua, Bahamas, Oct. 26, 1904, *Nash & Taylor* 1321, type collection *L. spathulifolium* (F, NY TYPE); rocky plain, East Caicos, Jacksonville and vicinity, Bahamas, Feb. 26-27, 1911, *Millspaugh & Millspaugh* 9084 (F, NY); rocky plain, Ambergris Cay, Caicos Group of Bahamas, March 12, 1911, *Millspaugh & Millspaugh* 9292 (F, NY).

11. *L. minimum* C. L. Hitchcock, sp. nov.<sup>44</sup>

Pl. 14, figs. 23-25; pl. 21.

<sup>44</sup> *L. minimum* C. L. Hitchcock, sp. nov., glabrum, 1-2 m. altum; ramis paucis, gracilibus; foliis filiformibus, 6-12 mm. longis, 0.25-1.25 mm. latis, 2-5-fasciculatis; calyce 2-3 mm. longo, 1.5-2 mm. in diametro, glabro, sed lobis ad vertices pubescentibus, 4-5-fido, prope quamdui tubo; corollae tubo 3-3.5 mm. longo, ad verticem 2 mm. in diametro ad basem 1 mm. in diametro, extra glabro, 5-fido, lobis 2-2.5 mm. longis; staminibus e corollae tubo 1.5-2 mm. exsertibus, corollae tubi partem medianam adhaerentibus, ad basem pubescentibus; bacca multiisperma, sed fructa ignota. Collected on lava beds near the shore, Villamit, Albemarle Island, Galapagos Islands, March 7, 1905-1906, *Stewart* 3365 (G TYPE, CA).

A glabrous, almost unarmed shrub about 1-2 m. tall; branches slender, straight, armed with spinose branchlets; leaves filiform, 6-12 mm. long, 0.25-1.25 mm. broad, borne in fascicles of 2-5 from much-enlarged nodes but 1-3 mm. apart; pedicels 3-5 mm. long; calyx 2-3 mm. long, 1.5-2 mm. in diameter, glabrous except for a tuft of hairs at the tips of the lobes, lobes 4 or 5, triangular, nearly as long as the tube; corolla-tube 3-3.5 mm. long, 2 mm. in diameter at apex, somewhat less than 1 mm. in diameter at the base, glabrous without, lobes 5, oval,  $\frac{2}{3}$  as long as the tube, reflexed, their margins very sparingly ciliate; stamens about equaling corolla-lobes, thus exserted 1.5-2 mm., filaments adnate to point about midway on corolla-tube, densely hairy for 0.5-1 mm. above base of free portion, adjacent corolla-tube glabrous; style exceeding stamens slightly, about 7 mm. long; ovary with well-developed disc, apparently several-ovuled; mature fruit not seen.

Type: on lava beds near the shore, Villamit, Albemarle Island, March 7, 1906, *Stewart 3365* (G).

Distribution: endemic to the Galapagos Islands.

Material seen:

GALAPAGOS ISLANDS: Gardner Island, near Hood Island, Feb. 3, 1905-06, *Stewart 3367* (CA, G); South Seymour Island, May, 1899, *Snodgrass & Heller 584* (G, S); Albemarle Island, March 7, 1905-06, *Stewart 3365* (CA, G TYPE); Turtle Cove, Albemarle Island, near the shore, March 12, 1905-06, *Stewart 3364* (CA); near east end Hood Island, Sept. 25, 1905-06, *Stewart 3368* (CA, G); along shore, Academy Bay, Indefatigable Island, Apr. 4, 1930, *Svenson 34* (B, MBG); Abingdon Island, common bushes forming thickets 2-3 ft. high near the shore, Sept. 21, 1905-06, *Stewart 3363* (CA); Duncan Island, Aug. 15, 1905-06, alt. 300 m., *Stewart 3366* (CA).

In his report on the vegetation of the Galapagos Islands, Dr. Robinson<sup>46</sup> reported this plant for the region, citing a collection by Bauer and the Snodgrass and Heller plant from Seymour Island, but stated that the status of the species could not be ascertained because of the lack of flowers. The type collection is one of the two collections which had either flowers or fruits, and is the only collection which had a perfect flower. Judged from its

<sup>46</sup> Robinson, Amer. Jour. Sci. 14: 199. 1902.

vegetative characters, *L. minimum* resembles *L. californicum* rather closely, but considered from the characters of the flower it is much more similar to *L. Tweedianum*, from which species it seems probable that it had its origin; however, it differs from its relative not only in vegetative characters, but also in the size of the corolla and other flower parts.

12. *L. pubescens* Miers, Ann. & Mag. Nat. Hist. II, 14: 339. 1854, and Ill. S. Amer. Pl. 2: 132, pl. 72E. 1857.

Pl. 14, figs. 20-22.

*L. patagonicum*  $\alpha$  *normale* var. *pubescens* Terrac. Malpighia 4: 533. 1891.

A much-branched, armed, densely tawny-pubescent shrub; branches densely leafy, tan, covered with dense pubescence, the spines very slender and sharp; leaves linear or linear-spatulate, 3-7 mm. long, 0.5 mm. broad, pubescent with short hairs, somewhat glandular (?), 1-4 in a fascicle, the nodes very close together; flowers borne singly, pedicels 1-2 mm. long; calyx campanulate, tube about 2 mm. long or slightly less, about as wide at top, covered with long multicellular hairs, 0.5 mm. long, lobes 5, lanceolate, acuminate, as long as tube or longer; corolla infundibuliform, tubular portion about 4 mm. long, 2 mm. in diameter at the top, 1 mm. in diameter at the base, glabrous without, lobes 5, oblong-ovate, spreading, nearly 3 mm. long, their margins very minutely and sparingly ciliate; stamens 5, exserted 1-2 mm., filaments unequal, longest ones about 1.5 mm. longer than corolla-tube, adnate below middle of corolla-tube, glabrous at base, but densely pilose about 0.5 mm. above this region, corolla-tube with tuft of hairs between each filament above the point of adnation; style about equalling stamens; berry "1½ lines in diameter."

Type: south of Prov. Buenos Aires, "Patagonia," Argentina, Tweedie (British Museum).

Distribution: central and south-central Argentina.

Material seen:

ARGENTINA: south of Prov. Buenos Ayres, J. Tweedie (KEW TYPE collection); Cordoba, Sarmiento, Rio V, Jan. 1922, Serie (MBG); San Luis, Nogoli, Feb. 9, 1925, Castellanos (MBG); San Luis, Alto Pencoso, Nov. 10, 1926, Castellanos (MBG);

Santa Cruz, Puerto Madryn, March 30, 1917, Bonarelli (MBG).

*Lycium pubescens*, *L. rachidocladum*, *L. tenuispinosum*, and *L. ovalilobum* are very closely related, and perhaps should be united into two species; but with the limited material at hand they appear distinct enough for specific delimitation. The following chart may help to distinguish them.

<i>ovalilobum</i>	<i>tenuispinosum</i>	<i>rachidocladum</i>	<i>pubescens</i>
LEAVES			
obovate to oblanceolate, 10-30 mm. long, 2-6 mm. broad.	linear-spatulate, 4-10 mm. long, 1-2 mm. broad.	spatulate, 5-10 mm. long, 2-4 mm. broad.	linear, 3-7 mm. long, 0.5 mm. broad.
PUBESCEENCE			
minutely glandular-pubescent.	densely tawny-pubescent.	densely pubescent with glandular or branched hairs.	densely tawny-pubescent, not, or very little, glandular.
CALYX-LOBES			
ovate to lanceolate, 3-5 mm. long.	lanceolate, acute, about 3 mm. long.	linear - lanceolate, 1.5-3 mm. long.	linear, acute, equal to tube or longer.
CORALLA SHAPE AND SIZE			
larger than <i>rachidocladum</i> or <i>pubescens</i> (6 mm.), more slender than <i>tenuispinosum</i> .	6 mm. long.	4-6 mm. long.	4 mm. long.
PROPORTION OF CORALLA-LOBES TO TUBE			
2-5.	1-2, or little more.	2-3.	3-5.
PUBESCEENCE ON OUTSIDE OF CORALLA			
margins of lobes, few on upper portion of corolla.	margins of lobes only, few there.	margins and backs of lobes.	margins of lobes, only.
POINT OF ADNATION OF FILAMENTA			
about center of corolla-tube.	about center.	above center of corolla-tube.	below center.
PUBESCEENCE AT BASE OF FILAMENTA			
pilose for 2 mm. above base.	pilose for 1 mm.	pilose at base.	glabrous at base, pilose above.

13. *L. rachidocladum* Dunal in DC. Prodr. 13<sup>1</sup>: 519. 1852; Miers, Ann. & Mag. Nat. Hist. II, 14: 189. 1854, and Ill. S. Amer. Pl. 2: 125, pl. 71B. 1857.

*L. chilense* subsp. *rachidocladum* (Dunal) Reiche, Anal. Univ. Chil. 123: 395. 1908, and Fl. Chil. 5: 315. 1910.

*L. chilense*  $\beta$  *rachidocladum* (Dunal) Terrac. Malpighia 4: 529. 1891.

A very spiny, much-branched, spreading shrub, branches stout, sometimes recurved, tan, pubescent when young, spines strong, about 5 mm. long; leaves spatulate, 5-10 mm. long, 2-4 mm. broad, 1-5 in a fascicle, densely pubescent with multicellular (some stellate) hairs, glandular; flowers few, borne singly on pedicels 0.5-2 mm. long; calyx cup-shaped, covered with long, multicellular hairs, tubular portion 1.5-2 mm. long, lobes 4 or 5, linear-lanceolate, 1.5-3 (4) mm. long; corolla infundibuliform, tubular portion 4-6 mm. long, somewhat pubescent on upper portion and on exterior of lobes, lobes 4 or 5, about  $\frac{2}{3}$  as long as tube, oblong-ovate, spreading or somewhat erect, margins sparsely ciliate; stamens 4 or 5, exserted, filaments subequal, nearly equaling corolla-lobes, adnate to above middle of corolla-tube, pilose at base of free portion, adjacent corolla-tube also hairy, anthers 1-1.5 mm. long; style slightly exceeding the stamens; ovary globose, about 3 mm. in diameter, several-seeded.

Type: "Prope Coquimbo," in Chile, Gaudichaud 83 (De Candolle Herbarium), according to DC. *l. c.*, but Gaudichaud 83 in the Delessert Herbarium is from Valparaiso.

Distribution: known only from Coquimbo and Valparaiso.

Material seen:

CHILE: Coquimbo, coll. of 1832, Colchester (KEW); Coquimbo, coll. of 1825, Macrae (D); Coquimbo, coll. of 1832, Lindley (KEW); Coquimbo, Feb. 1888, Philippi (KEW, US); Valparaiso, coll. of 1832, Gaudichaud 83 (D), surely TYPE collection, and possibly the actual type.

*Lycium rachidocladum* resembles *L. chilense* in flower size, but apparently lacks the external pubescence on the corolla, and appears to be more spiny than the latter species.

14. *L. tenuispinosum* Miers, Ann. & Mag. Nat. Hist. II, 14: 190. 1854, and Ill. S. Amer. Pl. 2: 125, pl. 71C. 1857.

Pl. 14, figs. 13-16.

*L. floribundum* Dunal in DC. Prodr. 13<sup>1</sup>: 513. 1852, not of

HBK; Miers, Ann. & Mag. Nat. Hist. II, 14: 188. 1854, and Ill. S. Amer. Pl. 2: 124, *pl. 70F*. 1857; Griseb. Abhandl. König. Ges. Wiss. Gött. 19: 216. 1874 (Pl. Lorent. 168. 1874) and 24: 245. 1879; Speg. Anal. Soc. Cient. Arg. (Nov. Add. Fl. Patag.) 53: 170. 1902.

*L. spinulosum* Miers, Ann. & Mag. Nat. Hist. II, 14: 191. 1854, and Ill. S. Amer. Pl. 2: 127, *pl. 71D*. 1857.

*L. spinulosum* Miers var. *parvifolium* Gill. ex Miers, Ann. & Mag. Nat. Hist. II, 14: 192. 1854, and Ill. S. Amer. Pl. 2: 127. 1857.

*L. microphyllum* Philippi, Anal. Univ. Chil. 37: 197. 1870, and Sert. Mend. Alt. 39. 1870 (not of Duham.).

*L. minutifolium* Philippi, Anal. Univ. Chil. 91: 27. 1895 (not of Remy).

*L. chubutense* Dusén, Svensk. Exped. Magell. 3<sup>8</sup>: 250, *pl. 9, figs. 1-2*. 1900.

*L. Philippianum* Speg. Anal. Soc. Cient. Arg. (Nov. Add. Fl. Patag.) 53: 171. 1902.

*L. floribundum*  $\alpha$  *normale* Terrac. Malpighia 4: 530. 1891.

*L. floribundum*  $\alpha$  *normale* var. *tenuispinosum* (Miers) Terrac. *l. c.* 531.

A sparingly branched, leafy, spiny, pubescent shrub 1-2 m. tall; branches horizontal or drooping, with many densely leafy, pungent-tipped branchlets, tan or gray, pubescent when young, spines slender, sharp; leaves linear-spatulate, 4-10 mm. long, 1 (2) mm. broad, densely tawny-pubescent, 3-7 in a fascicle, the nodes 3-7 mm. apart; flowers numerous, borne singly, the pedicels 1-2 (3) mm. long; calyx campanulate, tube 2-3 mm. long, lobes 5, lanceolate, rounded at apex, 2-4 mm. long, whole calyx covered with small glandular hairs interspersed with much longer multicellular flaccid hairs; corolla obconic-tubular, tubular portion 6 mm. long, nearly 3 mm. in diameter at the summit, 1-1.5 mm. in diameter at the base, glabrous without, lobes 5, ovate, about 3.5 mm. long (little more than half as long as the tube), slightly spreading, their margins very remotely ciliate; stamens 5, about equalling corolla-lobes, exserted when lobes are spreading, filaments subequal, about 2 mm. longer than corolla-tube, adnate to approximately midway on corolla-tube or slightly below or

above, pilose at base of free portion for 1 mm., adjacent corolla-tube also somewhat hairy, anthers 1.5–2 mm. long; style equalling or slightly exceeding stamens; berry ovoid, 3–4 mm. in diameter, several-seeded.

Type: collected at Mendoza, Argentina, by Miers (British Museum).

Distribution: western Argentina, from the Rio Negro to the Province of Mendoza.

Material seen:

ARGENTINA: Pampas, Jan. 1892, *Kuntze* (NY); Chubut, Trelew, Jan. 31, 1897, *Ameghino* 8 (MBG); Puerto Madryn, Terr. Chubut, Patagonia Orientalis, Nov. 8, 1895, *Dusén* 40 (KEW); Terr. Chubut, Peninsula Valdez, playa de Punta Norta, Dec. 30, 1912, *Exp. Roveretto* (MBG); vicinity of General Roca, Terr. Rio Negro, Sept. 1914–Feb. 1915, alt. 250–360 m., *Fischer* 80 (F, G, KEW, MBG, NY, US); Buenos-Aires, *Bacle* (D); Rio Negro, Viedma, camino al faro, Nov. 14, 1928, *Castellanos* (MBG); Pinto, Prov. Santiago del Estero, Oct. 1892, *Kuntze* (NY); without locality, but probably from Mendoza, *Miers* 735, probably TYPE collection *L. tenuispinosum* (US); Carmenso, Prov. Mendoza, Nov. 5, 1928, *Parodi* 8580 (G); Cordillera de Mendoza, *Bacle* (D); Mendoza, *Gillies* (KEW); "Buenos-Ayres (Mendoza)," *Balle* (D); Mendoza, *Gillies* (KEW TYPE collection *L. spinulosum* var. *parvifolium*); Vipos, Prov. Tucuman, Oct. 30, 1921, *Venturi* 1384 (G, MBG, US in part, near the var. *Friesii*); Mendoza, coll. of 1876, *Philippi*, TYPE collection *L. microphyllum* (D, V), photograph of TYPE collection at Berlin (G, MBG); San Juan, Quebrada del Zonda, Feb. 28, 1926, *Castellanos* (MBG).

*Lycium floribundum* of Dunal is antedated by *L. floribundum* HBK., and *L. minutifolium* Philippi (a name Philippi gave to *L. microphyllum* when he realized that his specific name was preoccupied by *L. microphyllum* Loisel.) was preceded by *L. minutifolium* of Remy; *L. Philippianum* is a name proposed by Spegazzini for Philippi's species because of this fact.

14a. *L. tenuispinosum* Miers var. *Friesii* (Dammer) C. L. Hitchcock, comb. nov.

*L. Friesii* U. Dammer in Engl. Bot. Jahrb. 37: 169. 1905.

Leaves spatulate, 5-12 mm. long, 2-3 mm. broad, glandular-pubescent; calyx glandular-pubescent, without long multicellular hairs intermixed, otherwise as in the species.

Type: Province of Salta, Argentina, Golgata in Quebrada del Toro in declivibus montis, apricis siccis, Nov. 11, 1901, alt. 2380 m., *Fries* 664 (ST).

Distribution: From Prov. Mendoza to Prov. Jujuy, Argentina.

Materials seen:

ARGENTINA: Maimara, Prov. Jujuy, May 13-15, 1873, *Lorentz & Hieronymus* 744 (KEW), and 745 (D); Prov. Jujuy, Dept. Humahuaca, in declio petrosis, Feb. 20, 1901, alt. 2800 m., *Claren* 11722 (ST); Prov. Tucuman, Dec. 1902, *Baer* 113 (D); Prov. Salta, Golgata in Quebrada del Toro, loco aprico, Dec. 11, 1901, alt. 2380 m., *Fries* 649 (ST); Prov. Salta, Golgata in Quebrada del Toro in declivibus montis apricis siccis, Nov. 11, 1901, alt. 2380 m., *Fries* 664 (ST TYPE); Argentine Republic, Oct. 1871, *Jameson*, in part (KEW); La Rioja, Sierra Vilgo, entre Cachiuyal y Safiogasta, Feb. 5, 1928, *Castellanos* (MBG); Argentine Republic, Oct. 1872, *Jameson*, in part (KEW, V); Mendoza, Dec. 1906, *Carette* (MBG).

The variety *Friesii* approaches *L. ovalilobum*, and is almost intermediate between that species and *tenuispinosum* but the corolla and calyx resemble the latter, and the leaves are neither so thin nor so large as in the former.

14b. *L. Venturii* C. L. Hitchcock, sp. nov.<sup>46</sup>

Pl. 23, fig. 2.

A rather sparsely and minutely pubescent shrub, scarcely, if at all, glandular; leaves spatulate, 5-12 mm. long, 3-4 mm. broad, thin in texture, rounded or acute at apex; flowers borne singly, pedicels 4-6 mm. long, minutely pubescent (glandular ?); calyx campanulate, minutely pubescent, tube about 3 mm. long, lobes 5, about equal to tube, lanceolate, acute; corolla narrowly tubular-

<sup>46</sup> *L. Venturii* C. L. Hitchcock, sp. nov., pubescens; foliis spatulatis, 5-12 mm. longis, 3-4 mm. latis; floribus solitariis, pedicellis 4-6 mm. longis, minute pubescentibus (glandulosis); calyce campanulato, pubescente, tube 3 mm. longo, lobis 5, 2-3 mm. longis, acutis; corolla tubulo-infundibuliformi, tubo 7-8 mm. longo, extra glabro, lobis 5, 4 mm. longis, marginibus non ciliatis; staminibus 4-5 mm. exsertis, corollae tubi partem medianam adhaerentibus, basi villosa; stylo staminibus aequale; bacc ignota. Collected at Tucuman, Los Quemados, Oct. 1919, *Venturi* 534 (Missouri Botanical Garden Herbarium, no. 997762 TYPE).

infundibuliform, tube 7–8 mm. long, glabrous without, lobes 5, oval, about 4 mm. long, spreading, their margins not ciliate; stamens exserted 4–5 mm., filaments subequal, adnate to near middle of corolla-tube or above, pilose for 1–1.5 mm. above their free bases, adjacent corolla-tube also pubescent, anthers 1.25 mm. long; style about equalling stamens; fruit not seen.

Type: Prov. of Tucuman, Los Quemados, Argentina, Oct. 1919, *Venturi* 534 (MBG).

Known only from the type collection.

The above plant resembles *L. tenuispinosum* var. *Friesii* in some respects, but is more like *L. Tweedianum* in others, the corollas being somewhat larger than in either. The calyx characters and pubescence of *L. Venturi* correspond with the former species, the flower shape, stamen length, and leaf characters more nearly agree with the latter; because of its intermediate nature, it is thought that *L. Venturi* may be a hybrid between the two.

15. *L. ovalilobum* C. L. Hitchcock, sp. nov.<sup>47</sup>

Pl. 14, figs. 29–31; pl. 22.

A rather densely branched, leafy, armed, spreading shrub, minutely glandular-pubescent; branches very leafy, long and slender, light brown, armed with sharp spines; leaves membranous-fleshy, obovate to oblanceolate, 1–3 cm. long, 0.2–0.6 cm. broad, rounded or slightly acute at apex, tapered to petiole as much as 1 cm. long in larger leaves, 1–5 in a fascicle; flowers usually borne singly, less commonly in 2's at the nodes, pedicels 1–4 mm. long; calyx-tube cup-shaped, 2–3 mm. long, nearly as wide, lobes 5, ovate to lanceolate, 3–5 mm. long, the whole rather minutely but densely glandular-pubescent with simple hairs; corolla white to yellowish, narrowly tubular-infundibuliform, tubular portion about 6 mm. long, 2 mm. in diameter at the top and 1 mm. in

<sup>47</sup> *L. ovalilobum* C. L. Hitchcock, sp. nov., fruticosum, ramosissimum, foliosum, spinosum, glandulosum, pubescens; ramis longis gracilibusque; folii stenuibus carnosulisque, obovatis vel oblanceolatis, 1–3 cm. longis, 0.2–0.6 cm. latis, 1–5 fasciculatis; calyx poculoforme, glanduloso-pubescente, tubo 2–3 mm. longo, lobis 3–5 mm. longis, ovatis vel lanceolatis; corolla candida vel subflava, tube 6 mm. longo, 5-fido, lobis 2.5 mm. longis; staminibus 5, exsertis, corollae tubi partem medianam adhaerentibus, basi villosis; stylo 1–3 mm. staminibus longiore; bacca ignota. Collected in the Prov. of Catamarca, Dept. Andalgala, Argentina, Sept. 9, 1916, Jørgensen 976 (Missouri Botanical Garden Herbarium, no. 818834 TYPE, G, US).

diameter at the base, 5-lobed, the lobes slightly spreading, ovate, nearly half as long as the tube (about 2.5 mm.), minutely pubescent at top of tube and on back of the lobes, their margins remotely ciliolate; stamens 5, about equalling corolla-lobes, filaments subequal, adnate to about middle of corolla-tube or slightly above, pilose for the first 2 mm. of their free portion, adjacent corolla-tube also somewhat pubescent, anthers 1.5 mm. long; style exceeding stamens from 1-3 mm.; berry not seen.

Type: Prov. Catamarca, Dept. Andalgala, Argentina, Sept. 9, 1916, *Jörgensen* 976 (MBG).

Distribution: central and northern Argentina.

Material seen:

ARGENTINA: El Dogue?, Prov. La Rioja, Dept. Capital, Dec. 26, 1928, *Venturi* 7807 (G); Cerro del Remate, Dept. Pellegrini, Prov. Santiago del Estero, Dec. 21, 1927, alt. 550 m., *Venturi* 5690, 5691 (CA); Gramilla, Prov. Santiago del Estero, Dept. Grimenez, March 13, 1930, alt. 300 m., *Venturi* 10280 (MBG, ST); Prov. Catamarca, Dept. Andalgala, Sept. 9, 1916, *Jörgensen* 976 (G, MBG TYPE, US); shrub found abundantly in waste places about San Juan and Jachal, Prov. San Juan, Sept. 1872, *Jameson* (KEW); arid plains, San Juan and Jachal, Prov. San Juan, Sept. 1872, *Jameson* (KEW).

16. *L. infaustum* Miers, Ann. & Mag. Nat. Hist. II, 14: 192. 1854, and Ill. S. Amer. Pl. 2: 128, pl. 71E. 1857; *Speg. Anal. Soc. Cient. Arg. (Nov. Add. Fl. Patag.)* 53: 170. 1902.

Pl. 14, figs. 26-28.

*L. floribundum*  $\beta$  *infaustum* (Miers) Terrac. *Malpighia* 4: 531. 1891, in part.

A very much branched, rigid, spiny, glabrous shrub, 0.5-2 m. tall; branches heavy, usually well armed with sharp spines, rough, gray; leaves numerous, glabrous, fleshy, terete-spatulate, 3-5 (9) mm. long, 0.5-1 (4?) mm. broad, 2-6 in a fascicle, the nodes very close (2-4 mm.) together; flowers few, borne singly, pedicels 3-6 mm. long; calyx cup-shaped, glabrous, 2-3 mm. long, nearly as wide, more or less irregularly 4-5-lobed, the lobes very short, triangular; corolla narrowly tubular-infundibuliform, with spreading lobes, tubular portion (4.5-5) 6-7 mm. long, 2-3 mm. wide at

summit, glabrous without, lobes 5, oblong-ovate, spreading, 2.5-4 mm. long, margins not ciliate, or very sparsely so; stamens 5 (6), filaments attached about  $\frac{3}{5}$  way from base of tube, equal or very slightly subequal, about equal in length to corolla-lobes, hence stamens usually exserted 3-4 mm. when the lobes are reflexed, glabrous at base of free portion, but very densely hairy for about 1.5 mm. above this glabrous portion, corolla-tube pubescent between the bases of the free portion of the filaments, anthers 1.5 mm. long; style (not mentioned in Miers' description) exceeding stamens as much as 3 mm.; "berry red," globose or ovoid, several-seeded.

Type: near Rio Colorado and Bahia Blanca, south of Province of Buenos Aires, Argentina, Tweedie (British Museum).

Distribution: central Argentina.

Material seen:

ARGENTINA: without locality, Sept. 1871, Jameson (KEW); without locality, Sept. 1872, Jameson (KEW in part, G); Mendoza, Guanacache, March 10, 1926, Castellanos (MBG); Totoralejos, Prov. Cordoba, Nov. 1892, Kuntze (NY, US); La Rioja, Alpasinche, Feb. 17, 1930, Castellanos (MBG); Patagonia, south of Prov. of Buenos Ayres, near Rio Colorado and Bahia Blanca, J. Tweedie (KEW TYPE collection).

All the material placed in this species has flowers with corollas that are larger, in all respects, than those of the type collection, the flowers of that plant having a corolla-tube that is scarcely 5 mm. long, all other dimensions being correspondingly small. The flowers are identical with the bulk of the material above cited except for size; however, Miers gave 6 mm. as the corolla length, so there is probably a variation of one or two mm. in this respect.

*Lycium infaustum* differs from *L. Tweedianum* in having larger flowers, more spiny and densely branched stems, and smaller "ericoid" leaves. From *L. rachidocladum* and its allies, it differs in its short calyx-lobes, more slender corolla-tube, and longer stamens.

17. *L. decipiens* U. Dammer in Engl. Bot. Jahrb. 37: 168. 1905.

Pl. 16, figs. 1-3.

A low, gnarled, spreading, pubescent, heavy shrub 2-4 dm. tall;

branches twisted, exceedingly thick and heavy, armed only by the pungent tips of the few short branchlets, much furrowed, dark gray; leaves 6-12 in a fascicle, linear, 7-10 mm. long, 0.5-1 mm. broad, margins usually revolute, covered with dense short hirtellous pubescence, greenish-cinereous, sessile; flowers numerous, borne singly, pedicels about 1 mm. long, exceedingly pubescent; calyx campanulate, 3.5-5 mm. long, densely pubescent with hairs nearly 0.5 mm. long (about 4 times as long as pubescence of leaves), 4-lobed, the lobes linear-lanceolate, acute, about equal to tube, often with red streaks on backs of lobes; corolla infundibuliform, contracted above ovary, tubular portion violet to lilac, 6.5-7.5 mm. long, about 3 mm. in diameter at top, 1.5 mm. in diameter at top of ovary, and 2 mm. at base, glabrous or with very few scattered hairs without, lobes 4 (5), very broadly ovate, 2 mm. or slightly less in length, apex rounded or slightly retuse, margins with very few hairs, glabrous or with few hairs on back, spreading; stamens 4 (5), partially exserted, filaments equal or but slightly subequal, somewhat enlarged at base, adnate to 1-2 mm. above base of the corolla, pubescent with long simple hairs for 3 mm. from base of free portion, adjacent corolla-tube apparently glabrous, anthers 1.25 mm. long; style 1-2 mm. shorter than stamens; ovary surmounted on well-developed disc, 10-18-ovuled; mature fruit not seen.

Type: hot, dry, rocky soil, Moceno, Prov. Jujuy, Argentina, Nov. 18, 1901, alt. 3500 m., *Fries* 794 (ST).

Distribution: central and northwestern Argentina, from Prov. Jujuy to Prov. Catamarca.

Material seen:

ARGENTINA: Corral Colorado, Sierra Famatina, Prov. de la Rioja, Feb. 11, 1879, *Hieronymus & Niederlein* 772 (D); loco aprico sicco saxoso, Moceno, Prov. Jujuy, Nov. 18, 1901, alt. 3500 m., *Fries* 794 (ST, TYPE); from same locality, *Fries* 783 (ST); Prov. Catamarca, Chashuil, Jan. 26, 1930, *Castellanos* (MBG) with some doubt; Chorrillos, Prov. Los Andes, Feb. 26, 1927, *Castellanos* (MBG).

*Lycium decipiens* is most closely related to, but quite distinct from, *L. ovalilobum* and its allies, differing in its four-lobed corolla, dwarf form, heavy, short branches, narrow leaves, and short

style, and in having its filaments adnate only near the base of the corolla-tube.

18. *L. pubitubum* C. L. Hitchcock, sp. nov.<sup>48</sup>

Pl. 15, figs. 19–21; pl. 23, fig. 1.

A densely leafy, spiny, sparsely pubescent shrub; branches apparently rigid, armed chiefly with the pungent tips of lateral branchlets; leaves borne in fascicles of 3–7 from enlarged nodes, glabrate, linear to spatulate, 8–12 mm. long, 1–2 mm. broad, apex rounded to acute, gradually attenuate to base; flowers borne singly at the nodes on glabrate pedicels 4–6 mm. long; calyx narrowly turbinate, 2.5–3.5 mm. long, 2 mm. in diameter at summit, tube glabrous, lobes 4, about  $\frac{1}{3}$  length of the tube, triangular, ciliate; corolla narrowly obconic, tubular portion 8–9 mm. long, 2.5–3 mm. in diameter at the summit, 1.8 mm. in diameter at base, slightly contracted and rather thickly pubescent with simple hairs just above ovary, rest of tube glabrous exteriorly, lobes 4, oblong, oval, 1.5–2 mm. long, spreading, their margins ciliate, otherwise glabrous; stamens 4, about equaling corolla-tube, filaments attached at point about  $\frac{1}{6}$  from base of corolla-tube, their free bases glabrate, densely pilose for 2 mm. above, adjacent corolla-tube also densely pubescent, anthers slightly more than 1 mm. long; style exserted 2–4 mm. from corolla-tube; ovary with several ovules, but mature fruit not seen.

Type: Argentina, Patagonia, 50° 30', in 1882–84, Moreno & Tonini 240 (NY).

Distribution: apparently known only from region of the type locality.

Material seen:

ARGENTINA: Patagonia, 50° 30', in 1882–84, Moreno & Tonini 240 (NY).

*Lycium pubitubum* is a very distinct species, well separated

<sup>48</sup> *L. pubitubum* C. L. Hitchcock, sp. nov., foliosum, spinosum, pubescens; ramis spinosis, foliis 3–7-fasciculatis, linearibus vel spatulatis, glabris, 8–12 mm. longis, 1–2 mm. latis; calyce turbinato, 2.5–3.5 mm. longo, tubo glabro, lobis 4, ca. 1 mm. longis, ciliatis; corolla tubulo-obconica, tubo 8–9 mm. longo, extra ad verticem ovarii pubescente, lobis 4, 1.5–2 mm. longis; staminibus corollae tubo aequalibus, corollae tubi partem tertiam inferam adhaerentibus, ad basem glabris, supra basem pubescentibus; stylo 2–4 mm. exerto; bacca ignota. Collected in Patagonia, Argentina, 50° 30', in 1882–84, Moreno & Tonini 240 (NY TYPE).

from the rest of the genus, but showing somewhat remote relationship with *L. decipiens*.

19. *L. carolinianum* Walt. Fl. Carol. 84. 1788; Michx. Fl. Bor. Amer. 1: 95. 1803; Pursh, Fl. Amer. Sept. 1: 97. 1814; Roem. & Schult. Syst. Veg. 4: 697. 1819; Walp. Rep. Bot. Syst. 3: 111. 1844; Dunal in DC. Prodr. 13<sup>1</sup>: 513. 1852; Miers, Ann. & Mag. Nat. Hist. II, 14: 193. 1854, and Ill. S. Amer. Pl. 2: 128, *pl. 71F*. 1857, in part; Gray, Proc. Amer. Acad. 6: 45. 1862, in part, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238. 1886, in part; Small, Fl. S. E. United States, 992. 1903. Pl. 15, figs. 30-32.

*L. carolinianum*  $\alpha$  *normale* Terrac. Malpighia 4: 518. 1891, in part.

*Panzeria caroliniana* Gmel. Syst. Nat. 2: 247. 1791.

A rather sparingly branched, armed shrub, usually with few basal, and some upper branches, erect or slightly spreading, 0.3-1 m. tall, glabrous; young branchlets often with short, thick spines about 1 cm. long, or branchlets unarmed, older branchlets with spinose branchlets, tan to dark gray; leaves 3-10 in a fascicle, narrowly terete-spatulate to spatuloid, somewhat succulent, 1-2.5 cm. long, 1-2 mm. broad, midnerve scarcely visible, rounded, or occasionally somewhat acute at apex, attenuate at base, practically sessile, glabrous; flowers with pedicels 0.5-3 cm. long; calyx cup-shaped, glabrous, about 3 mm. long, 4-lobed, the lobes triangular, obtuse, nearly equaling tube, margins sometimes remotely ciliate; corolla lavender to purple, rotate-campanulate, 7-10 mm. long, including lobes, the tube about equal to lobes or slightly shorter, 1-1.5 mm. in diameter at top of ovary, 3-5 mm. in diameter at summit, glabrous without, lobes 4, rarely 5, ovate, base abruptly contracted, apex rounded or slightly emarginate, spreading, their margins not ciliate, or but very sparsely so; stamens exserted due to spreading of lobes of the corolla, filaments adnate to about midway from the base of the tube, equaling, or somewhat shorter than corolla-lobes, densely pilose on their lower  $\frac{1}{6}$  or  $\frac{1}{4}$  of free portion, adjacent corolla-tube but very sparsely hairy, anthers 1-1.5 mm. long; style scarcely so long as filaments; berry ovoid, fleshy, red, about 1 cm. in diameter, with 50 or more seeds, purple in old or dried material.

Type: no type designated, but Curtiss's number 6543 is taken as typically representing this species.

Distribution: common throughout the coastal region of Florida and eastern portion of Alabama; Cuba and other islands of the West Indies.

Material seen:

UNITED STATES OF AMERICA

FLORIDA: without locality, *Rolfs* 240 (F, MBG); Anastasia Is., Aug. 1894, *Williamson* (PA); Gulf, Florida, *Chapman* (NY); *Planters*, June-July, 1898, *Hitchcock* (F); Vaca Key, June 22, 1904, *Brown* 88 (PA); *Grass Key*, June 22, 1904, *Brown* 97 (PA); *Planters*, April, 1903, *Hitchcock* (F); salt marsh, Myers, July-Aug. 1900, *Hitchcock* 241 (F, G, MBG, NY, US); salt marshes, Myers, Jan. 26, 1896, *Webber* 201 (F) and 201a (MBG); Elliott's Key, Jan. 4, 1896, *Webber* 324 (F, MBG); Elliott's Key, Nov. 6-7, 1901, *Small & Nash* 227 (NY); *Newport*, Key Largo, March 26-29, 1898, *Pollard, Collins & Morris* 182 (US); Key West, Monroe Co., coll. of 1874, *Palmer* 377 (F, G, MBG); Key West, Feb. 28-March 9, 1904, *Lansing* 2012 (NY); Key West, March 27-30, 1906, *Hitchcock* (F); Key West, Apr. 7-12, 1909, *Britton* 517 (NY); Key West, *Blodgett* (F, NY, US); Key West, May, 1880, *F. Tweedie* 211 (US); Dade Co., Nov. 7, 1903, *Eaton* 52 (F); mangrove swamp, south of Miami, March 19, 1904, *Britton* 62 (F, NY); on shore, Miami, Oct. 28-Nov. 28, 1903, *Small & Carter* 1215 (NY, PA); Miami, Oct. 27-Nov. 13, 1901, *Small & Nash* (NY); borders of everglades, near Royal Palm Hammock, Dade Co., May 22, 1925, *E. J. Palmer* 27481 (MBG); Marco, Collier Co., July-Aug. 1900, *Hitchcock* (F); Punta Rassa, Lee Co., July-Aug. 1900, *Hitchcock* (F); Sanibel, Lee Co., July-Aug. 1900, *Hitchcock* (F); vicinity of Fort Myers, Lee Co., Dec. 18, 1919, *Standley* 18989 (US); vicinity of Fort Myers, creek banks, Dec. 21, 1916, *Miss Standley* 374 (P, US); Boca Grande, Lee Co., Nov. 1913, *von Schrenk* (MBG); Shaw's Point (near Manatee), Oct. 22, 1898, *Simpson* 88 (US); Clearwater, Pinellas Co., Jan.-Feb. 1902, *Huger* (NY); Brevard Co., Oct. 26, 1902, *Fredholm* 5506 (G); crevice of coquina rock at edge of Indian River, Brevard Co., Oct. 10, 1894, *Swingle* (F); near Daytona, Volusia Co., Apr. 8, 1906, *Deam* (G); Cedar Keys, Levy Co., Oct. 1877, *Garber* (G),

US); Cedar Keys, Dec. 25, 1906, *Mell* (MBG); Cedar Keys, March 18, 1926, *Miller* 327 (US); Cedar Keys, Oct. 1877, *Porter* (F); Cedar Keys, March 7, 1880, *J. D. Smith* (US); salt marshes, near mouth of St. John's R., Duval Co., Oct. 10, 1899, *Curtiss* 6543 (C, D, G, MBG, NY, S, US); islands near mouth of St. John's R., *Curtiss* 2216 (G, MBG, NY, US).

ALABAMA: wet gravelly beach, Westfouldivian?, Aug. 15, 1879, *C. Mohr* (US).

WEST INDIAN ISLANDS: rocky parts of the landing place, Patos Is., June 9, 1929, *Broadway* 7201 (MBG, US); Lomo de Loro, Cayo Romanio, Camaguey, Cuba, Oct. 21, 1909, *Shafer* 2632 (F, G, NY, PA, US); border of saline plain, Guantanamo Bay, Oriente, Cuba, March 17-30, 1909, *Britton* 2266 (NY); Bay of Mariel, Province of Pinar del Rio, Sept. 21, 1910, *Britton & Earle* 7578 (F, NY, US), more spiny than Florida plants; Prov. of Santa Clara, Rio Govelan, March 26, 1910, *Britton, Earle & Wilson* 6027 (NY).

*Lycium carolinianum* is usually found on tide land, or in the vicinity of pools near the ocean or a short distance inland. It is quite distinct from any other species of the American *Lycia*, being most closely related to *L. Tweedianum* and its variety *chrysocarpum* from which it may be distinguished by the larger, more ovate corolla-lobes.

19a. *L. carolinianum* var. *quadrifidum* (Moç. & Sessé ex Dunal)  
C. L. Hitchcock, comb. nov.

*L. quadrifidum* Moç. & Sessé ex Dunal in DC. Prodr. 13<sup>1</sup>: 513. 1852 (based on Moçino and Sessé, Ic. Mex. Pl. pl. 914, acc. Dunal in DC. Prodr. l. c.); Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882.

*L. carolinianum* Gray, Proc. Amer. Acad. 6: 45. 1862, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238. 1886, in part; Miers, Ann. & Mag. Nat. Hist. II, 14: 193. 1854, and Ill. S. Amer. Pl. 2: 128, pl. 71F. 1857, in part; Coulter. Contr. U. S. Nat. Herb. (Bot. W. Tex.) 2: 302. 1892; I. M. Johnston. Proc. Calif. Acad. Sci. IV. 12: 1155. 1924; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924.

*L. carolinianum*  $\alpha$  *normale* Terrac. Malpighia 4: 518. 1891, in part.

Leaves 2-5 in a fascicle, 1.8-3 cm. long, 2-4 mm. broad, mid-nerve plainly visible; branching, if any, mostly basal; flowers about 1 cm. long.

Type: based on *pl. 914* of Moçino & Sessé, Ic. Mex. Pl. acc. to Dunal in DC. Prodr. l. c. C. G. Pringle's number 4174, from "saline meadows bordering Lake Cuitzeo, Michoacan, Mexico, Aug. 8, 1892," is a plant which matches the plate well, and is good representative material of this well-marked variety.

Distribution: along the coasts of Mississippi, Louisiana, and Texas, in the United States; eastern Mexico, and at Lake Cuitzeo in Michoacan, at Sinaloa, and at San Jose del Cabo, Baja California.

Material seen:

UNITED STATES OF AMERICA

MISSISSIPPI: Sam Holmes Island, Mississippi Delta, Aug. 14, 1900, *Lloyd & Tracy* 48 (NY).

LOUISIANA: in swamps, more or less saltish, Pointe à la Hache P. O., Plaquemines Co., Oct. 8, 1885, *Langlois* (S); Bayou fouters, Plaquemines Co., Aug. 1880, *Langlois* 242 (F); Battledore Is., April 18, 1900, *Tracy & Lloyd* 48 (MBG, US); low brackish prairies, Cameron, Cameron Parish, Sept. 13, 1915, *Palmer* 8528 (MBG); vicinity of Cameron, Nov. 29, 1910, *McAtee* 1907, 1908, 1909 (US).

TEXAS: without locality, *Callam* (NY); Oct. 1835, *Drummond* 244 (D, G, NY); near headwaters of Indian Creek, Brown Co., Aug. 11, 1877, *Reverchon* 684 (MBG); Green Island, June 23-29, 1922, *Tharp* 1204 (US); near mouth of Pecos R., coll. of 1881, *Havard* 161 (G); vicinity of Corpus Christi, Nueces Co., Oct. 24, 1913, *Rose* 18063 (NY, US); Corpus Christi Bay, Dec. 1879, *Palmer* 953 (G, US); Corpus Christi, Sept. 27, 1906, *A. H. Howell* 285 (US); Corpus Christi, March 5-12, 1894, *Heller* 1395 (NY, US); Santa Clara, June, 1851, *Lindheimer* (G, MBG); El Jardin, July 23, 1923, *Runyon* (MBG); Sand Point, Calhoun Co., Dec. 1918, *Drushel* (MBG); Galveston Is., Sept. 1841, *Lindheimer* (MBG), and Nov. 1842, *Lindheimer* (G); Galveston, Sept. 12, 1915, *Fisher* 1741 (US); Galveston, Aug. 12, 1915, *Fisher* 1740 (US); Galveston, March 15, 1928, *Benke* 4588 (F); Galveston, Sept. 16, 1877, *Ward* (US); sandy seashore, Galveston, Aug. 8,

1902, *Reverchon* 3242 (MBG); plains near Eagle Pass, Sept. 24, 1852, *Bigelow* (NY); Virginia Point, Apr. 15, 1899, *Bray* 38 (US); Los Fresnos, Dec. 1, 1924, *Runyon* 692 (US); Port Bolivar, Aug. 29, 1917, *Fisher* 5161 (US); Bayshore near mouth of Cedar Bayou, Dec. 2, 1918, *Hanson* (NY); near Bloomington, May 19, 1924, *Schultz* 2497 (CA); Rio Bravo, salt marshes near its mouth, Oct. 1853, *Schott* 29 (NY); Brownsville, salty soil, in 1922, *Runyon* 273 (US).

#### MEXICO

TAMAULIPAS: vicinity of Tampico, March 10–April 19, 1910, alt. 15 m., *Palmer* 201 (US).

HIDALGO: Mexcaltitan, shallow lagoons, Oct. 30, 1926, *Mexia* 1011 (CA, C, MBG, US).

MICHOACAN: saline meadows bordering Lake Cuitzeo, Aug. 8, 1892, *Pringle* 4174 (C, CA, D, F, G, MBG, NY, PA, ST, US, V).

SINALOA: El Carrizo, coll. of 1925, alt. 800 m., *Ortega* 6014 (US); along beach, vicinity of Mazatlan, Apr. 6, 1910, *Rose, Standley & Russell* 14106 (NY, US); plains north of Mazatlan, Sept. 27, 1925, *Mexia* 83 (C, CA).

BAJA CALIFORNIA: San Jose del Cabo, coll. of 1898, *Graben-dorffer* (C), Nov. 25, 1902, *T. S. Brandegee* (C, S, US), Oct. 16, 1899, *T. S. Brandegee* (C, US); La Paz, Feb. 4, 1928, *Jones* 24400 (P).

The variety *quadrifidum* is well set off from the species by the less numerous but much larger leaves, the larger flowers, and the more numerous spines, as well as by its definite geographic distribution.

#### 19b. *L. carolinianum* var. *Gaumeri* C. L. Hitchcock, var. nov.<sup>4</sup>

Tall, somewhat scandent shrubs or tree-like forms 2–8 m. tall; leaves 15–30 mm. long, about 2.5 mm. broad, 1–4 in a fascicle, scarcely, if at all, armed; flowers 8–9 mm. long.

Type: Silam, Yucatan, *Gaumer* 1248 (F).

Distribution: Yucatan, along the Atlantic coast, and at Lake Chichaneanab.

<sup>4</sup> *L. carolinianum* var. *Gaumeri* C. L. Hitchcock, var. nov., *arbusta vel arboreo* 2–8 m. *alta*; *foliis* 15–30 mm. *longis*, 2.5 mm. *latis*; *floribus* 8–9 mm. *longis*. Collected at Silam, Yucatan, *Gaumer* 1248 (Field Museum, TYPE).

## Material seen:

MEXICO: Silam, Yucatan, *Gaumer 1248* (F TYPE); Progresso, Yucatan, *Gaumer 23162* (F); Progresso, Apr. 6, 1865, *Schott 286* (F); Territorio Quintana Roo, Yucatan, Lake Chichancanab, *Gaumer 1351* and *2286* (F).

The notes accompanying the above specimens indicate that this is an unusually tall shrub or tree; however, the leaf characters and all details of the flower structure are identical with the species, so that it would not be feasible to consider it as specifically distinct.

19c. *L. carolinianum* Walt. var. *sandwicense* (Gray) C. L. Hitchcock, comb. nov.

*L. sandwicense* Gray, Proc. Amer. Acad. 6: 44. 1862; Skottsberg, Nat. Hist. Juan Fernandez & Easter Island 2: 496. 1928.

*L. carolinianum*  $\beta$  *sandwicense* (Gray) Terrac. Malpighia 4: 518. 1891.

Almost devoid of spines; leaves 20–35 mm. long, 2.5–5 mm. broad; corolla 6–9 mm. long; filaments but sparsely pubescent at base of free portion.

Type: Sandwich Islands, Oahu, coll. by Wilkes Expl. Exped. of 1838–42, *Mann & Brigham 597* (G).

Distribution: Hawaiian Islands and Easter Island.

## Material seen:

HAWAIIAN ISLANDS: Island of Oahu, coll. of 1838–42, *Mann & Brigham 597* (G TYPE, MBG); Island of Oahu, at Diamond Head, Apr. 8, 1895, *Heller 2093* (G, MBG); Kolia, Kanai, on rocky seashore, *Mann & Brigham 596* (G).

ISLAND OF PASCUA: seashore west of Mataveri, June 26, 1917, *Skottsberg 664* (G, ST, US).

In his original description, Gray indicated his doubt that this plant was native to the Hawaiian Islands, describing his type as having glabrate filaments. This condition the writer doubts, as other material examined from the same locality, and apparently identical with the type, has some pubescence at the base of the filaments, although not so much as is commonly found in the species and its mainland varieties. Aside from the smaller flowers and lack of spines, the type of *L. sandwicense* is an exact match

for much of the material of the variety *quadrididum* (lacking the dense pubescence of the filaments), but resembles the species more closely in these two points.

20. *L. Berlandieri* Dunal in DC. Prodr. 13<sup>1</sup>: 520. 1852; Miers, Ann. & Mag. Nat. Hist. II, 14: 138. 1854, and Ill. S. Amer. Pl. 2: 114. 1857; Gray, Proc. Amer. Acad. 6: 47. 1862, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239. 1886; Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882; Coulter. Contr. U. S. Nat. Herb. (Bot. W. Tex.) 2: 302. 1892; Small, Fl. S. E. United States, 992. 1903; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924.

Pl. 15, figs. 10-12.

*L. Berlandieri*  $\alpha$  *normale* Terrac. Malpighia 4: 520. 1891.

*L. Berlandieri*  $\beta$  *Miersii* Terrac. l. c.

*L. senticosum* Miers, Ann. & Mag. Nat. Hist. II, 14: 138. 1854, and Ill. S. Amer. Pl. 2: 114, pl. 68D. 1857.

*L. stolidum* Miers, Ann. & Mag. Nat. Hist. II, 14: 191. 1854, and Ill. S. Amer. Pl. 2: 126, pl. 71A. 1857.

A rather sparingly branched, glabrous or pubescent shrub 0.7-2.5 m. tall, armed with few needle-like spines at ends of young branches, or practically unarmed; branches somewhat crooked, decumbent, slender, silvery-gray to reddish; leaves glabrate, sometimes finely pubescent, linear to elliptic-spatulate, 1-2.5 cm. long, 0.1-0.25 cm. broad, rounded or sometimes acute at apex, 1-3 in a fascicle, the nodes rather distant, therefore branches sparingly leafy; flowers borne singly or in 2's, pedicels 3-20 mm. long; calyx cup-shaped, 1-2 mm. long and nearly as wide, 3-5-lobed, lobes equal and about  $\frac{1}{3}$  as long as tube, or unequal, the calyx frequently splitting nearly to base on one side, glabrous except for a small tuft of hair at the tip of each lobe, infrequently the whole calyx pubescent; corolla blue or pale lavender, tubular portion obconic-infundibuliform, much constricted immediately above calyx, 4-8 mm. long, 2-4 mm. in diameter at the summit, 1 mm. in diameter or less just above the calyx, glabrate without, sometimes with few scattered hairs just above and below the summit of calyx, lobes 4 or 5,  $\frac{1}{6}$ - $\frac{1}{4}$  the length of the tube, usually reflexed and sometimes recurved; stamens unequal or subequal, about equal to corolla-lobes, hence slightly exserted, rarely in-

cluded, filaments adnate to a point about  $\frac{1}{3}$  way from base of tube, hairy for the first  $\frac{1}{4}$ — $\frac{1}{3}$  of their free portion, adjacent corolla-tube but slightly hairy, anthers about 1 mm. long; style equalling or very slightly exceeding stamens; berry globose-ellipsoid, about 4 mm. in diameter, 8–30-seeded.

Type: Mexico, near Laredo, Feb. 1828, *Berlandier* 1411 (De Candolle Herbarium).

Distribution: southern Texas, eastern New Mexico, and northern Mexico.

Material seen:

UNITED STATES OF AMERICA

TEXAS: western Texas, Aug. 1901, *Earle* 650 (NY); Texas, *Buckley* (PA); Rio Pecos, W. Texas, Sept. 1881, *Havard* 156 (G, PA); Tex. & Pacific RR., W. Texas, coll. of 1881, *Havard* 157 (G); without locality, Apr. 1881, *Havard* (F, US); Bexar Co., *Jermy* 66 (US); without locality, *Mex. Bound. Surv.* 1028 (US); hills near Laredo, May 25, 1852, *Schott* (NY); western Texas, coll. of 1890, *Nealley* (F); San Ygnacia, Zapato Co., July 4, 1925, *Runyon* 878 (US); foothills of Chenate Mts., Sept. 8, 1914, *Young* (MBG); Rio Grande, coll. of 1848, *Wright* (G); sandy plains, mouth of canyon on the Rio Grande, June 26, 1852, *Bigelow* (NY); Big Springs, May 20–23, 1899, *Bray* 395 (US); lower part of Juniper Canyon, July 15–18, 1921, alt. 1100 m., *Ferris & Duncan* 3145 (CA, MBG, NY, S); Eagle Pass, May 10–14, 1904, *Griffiths* 6352 (MBG); Eagle Pass, Maverick Co., May, 1913, *Orcutt* 6000 (MBG); Mt. Anthony, Franklin Mts., at Canutillo, El Paso Co., July 21, 1911, *Barlow* (F); Redford, Aug. 7, 1919, *Hanson* 786 (G, US); near Capate Mt., W. Texas, Sept. 1883, *Havard* 90 (G, US); Beeville, Sept. 19, 1906, *A. H. Howell* 279 (US); near Brackettsville, July 2, 1917, *Munz* 1424 (P); 6 mi. south of San Antonio, June 18, 1921, *Schultz* 570 (US); near San Antonio, 1900–02, *Wilkinson* (MBG); San Antonio, Sept. 1879, *Ball* 904 (G); 105 mi. s. w. of San Antonio, Sept. 1879, *Palmer* 950 (G, US); dry calcareous banks, San Angelo, Tom Green Co., Oct. 25, 1916, *E. J. Palmer* 11134 (MBG); Comstock, Vervalde Co., Oct. 9, 1917, *E. J. Palmer* 12955 (CA, MBG); near Brownsville, coll. of 1895, *Townsend* 3 (US); 12 mi. from Brownsville, on San Benito Rd., Cameron Co., *Ferris & Duncan* 3210 (CA, MBG, NY, S);

Laredo, Feb. 1828, *Berlandier* 1411, TYPE collection (D TYPE, G, V); Laredo, June 1828, *Berlandier* 1788 (G); Laredo, Feb. 1891, *Dodge* 60 (US); between the Frio and Nueces Rivers, on the road to Laredo, Jan. 27-28, 1880, *Palmer* 951 (G, MBG, NY, US); Laredo, on the Rio Grande, Aug. 1879, *Palmer* 952 (G, PA, US); arroyos, Presidio del Norte, Aug. 4, 1852, *Bigelow* (NY); San Angelo, May 18-19, 1899, *Bray* 344 (US); collected in expedition from western Texas to El Paso, New Mexico, May-Oct. 1849, *Wright* 540, TYPE collection *L. stolidum* (D, F, G, MBG, US); exp. from western Texas to El Paso, N. M., May-Oct. 1849, *Wright* 542 (D, F, G, US); plains south of Luna Well, July 15, 1897, *Wooton* (US); Sheep Springs, July, 1880, *Rusby* 306½ (C, US); E. Carancahua Pt., Jackson Co., Sept. 9, 1922, *Tharp* 1414 (US); Keller's Point, Sept. 7, 1922, *Tharp* 1635 (US).

NEW MEXICO: Pecos Valley, near Texas line, June 19, 1901, *Bailey* 744 (US); New Mexico?, in 1852, *Wright* (G).

#### MEXICO

COAHUILA: Mts., 6 mi. east of Saltillo, July, 1880, *Palmer* 958 (G, US); Saltillo, July 1-8, 1880, *Palmer* 957 (F, G, US); near the city of Matamoros, Jan. 1836, *Berlandier* 3022 (D, G, MBG, NY).

SONORA: Picu Pass, March 23, 1926, *Long* 33 (US).

SAN LUIS POTOSI: coll. of 1878, alt. 2000 m., *Parry & Palmer* 656½ (G).

NUEVO LEON: Carrizal, near Monterey, Jan. 1828, *Berlandier* "no. 1426-166" TYPE collection *L. senticosum*, but 2 plants on sheet, 1 not *Lycium* (G); Monterey, coll. of 1924, *Orcutt* 1269 (US).

*Lycium Berlandieri* breaks up into several well-marked varieties or forms, some of which have previously been regarded as species; however, since these aggregates differ by minor characters only, they can be more consistently treated as varieties. *Lycium stolidum* and *L. senticosum* have correctly been regarded as conspecific with *L. Berlandieri* by all workers since their publication by Miers.

20a. *L. Berlandieri* forma *parviflorum* (Gray) C. L. Hitchcock, comb. nov.

*L. parviflorum* Gray, Proc. Amer. Acad. 6: 48. 1862, and Syn.

Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239, 437. 1886; Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882; Woot. & Standl. Contr. U. S. Nat. Herb. (Fl. N. Mex.) 19: 569. 1915.

*L. Berlandieri* & *barbinodum* var. *parviflorum* (Gray) Terrac. Malpighia 4: 522. 1891.

*L. barbinodum* Miers as treated by Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1288. 1924.

Branches stouter and more leafy than in the species, nodes frequently cottony; flowers smaller than in the species, 4–6 (8) mm. long.

Type: Sonora, Mexico, Sept. 1851, *Thurber* 962 (G).

Distribution: central and southern New Mexico and southern Arizona, and states of Sonora, Coahuila, and San Luis Potosi, Mexico.

#### Material seen:

##### UNITED STATES OF AMERICA

NEW MEXICO: White Mts., Lincoln Co., July 20, 1897, *Wooton* 173 (C, D, G, MBG, NY, P, S, US); White Sands, Dona Ana Co., Aug. 8, 1905, *Wooton* (US); along Tularosa Creek, Otero Co., Aug. 24, 1897, *Wooton* (US); White Sands, Otero Co., Aug. 24, 1899, *Wooton* (US); wash, 1 mi. west of San Miguel, Aug. 20, 1930, alt. 1200 m., *Fosberg* S3875 (MBG); flats, southwest of Pyramid Peak, Aug. 1, 1930, alt. 1275 m., *Fosberg* S3748 (MBG); Cuchillo, Oct. 21, 1909, alt. 1500 m., *Goldman* 1789 (US); Florida Mts., Aug. 27, 1895, *Mulford* 1049a (US); 20 mi. northeast of Roswell, Chaves Co., June 14, 1930, alt. 1100 m., *Goodman & Hitchcock* 1135 (MBG).

ARIZONA: Tucson Mts., Nov. 1902, *Griffiths* 3463 (NY, US); hills in Sabino Canyon, near Tucson, March 14, 1930, *Eastwood* 17745 (CA); Sweetwater, few miles west of Sacaton, *Harrison* 1784 (SAC); S. H. Mts., March 31, 1930, *Peebles & Loomis* 6774 (US).

#### MEXICO

SONORA: Buena Vista ranch, El Alamo, May 27, 1925, *Kennedy* 7100, intermediate between this form and *L. Andersonii* var. *Wrightii* (C, US); Sonora, Sept. 1851, *Thurber* 962 (G TYPE, NY).

COAHUILA: La Ventura, Aug. 2–5, 1896, *E. W. Nelson* 3904 (G, US); Torreon, Oct. 13–20, 1898, *Palmer* 490 (D, F, G, NY, US);

Peña, Feb. 1905, *Purpus* 1089 (C, NY); Saltillo, coll. of 1898, *Palmer* 112, 247 (C, D, F, G, MBG, NY, US); mountains east of Saltillo, Apr. 1880, *Palmer* 954 (G, PA, US).

SAN LUIS POTOSI: valley of San Luis Potosi, coll. of 1876, *Schaffner* 1059 (G), Aug. 1871, *Schaffner* (G); region of San Luis Potosi, coll. of 1878, alt. 2300 m., *Parry & Palmer* 654 (G, MBG), and 654½ (G); west of Monterey, *Gregg* 199 (G, MBG).

The differences between the forma *parviflorum* and the species are almost intangible, but in general there is a tendency for the form to have more robust plants, and to have smaller and more numerous leaves.

**20b. *L. Berlandieri* var. *longistylum* C. L. Hitchcock, var. nov.<sup>50</sup>**

Pl. 15, figs. 7-9; pl. 18, figs. 1-3.

Branches flexuous, sparingly armed; leaves 8-25 mm. long, 1-3 mm. broad; corolla much expanded above, the 5 lobes ( $\frac{1}{5}$ )  $\frac{1}{5}$ - $\frac{1}{2}$  as long as the tube; stamens 1-3 mm. longer than corolla-lobes; style equal to, or exceeding the stamens 1-2 (6) mm.

Type: foothills of the Santa Catalina Mts., Arizona, July 28, 1881, *Pringle* (MBG).

Distribution: southern Arizona, known only from a few localities in the southeastern portion of the state.

Material seen:

UNITED STATES OF AMERICA

ARIZONA: foothills of the Santa Catalina Mts., July 28, 1881, *Pringle* (D, F, MBG TYPE, NY, US, but not G); mountains of Arizona, coll. of 1881, *Pringle* 176 (G, probably part of TYPE collection); Table Top Mt., Aug. 16, 1930, *Harrison, Kearney & Fulton* 7295 (MBG, P, US); San Tan Mts., May 13, 1926, *Peebles & Harrison* 1853 (US); S. H. Mountains, March 31, 1930, *Peebles & Loomis* 6761 (MBG, P, SAC, US) (style exserted 5-7 mm., stamens non-functional).

<sup>50</sup> *L. Berlandieri* var. *longistylum* C. L. Hitchcock, var. nov., glabrum, 1-2 m. altum; ramis restricte spinosis flexibus, sed rectis; foliis 8-25 mm. longis, 1-3 mm. latis; corolla lata, infundibuliformi, 6 mm. longa, 5-fida, lobis ( $\frac{1}{5}$ )  $\frac{1}{5}$ - $\frac{1}{2}$  quamdiu tubo; staminibus corolla 1-3 mm. longioribus; stylo staminibus aequante vel 1-2 (6) mm. longiore. Collected in the foothills of the Santa Catalina Mts., Arizona, July 28, 1881, C. G. Pringle (Missouri Botanical Garden Herbarium, no. 127338 TYPE, F, NY, US).

This variety is very well marked by the extremely long stamens and style, a condition which is made more conspicuous due to the recurving of the corolla-lobes.

20c. *L. Berlandieri* var. *peninsulare* (Brandg.) C. L. Hitchcock, comb. nov.

*L. peninsulare* T. S. Brandg. Univ. Cal. Publ. Bot. 6: 359. 1916; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1288. 1924.

*L. parviflorum* var. *peninsulare* (Brandg.) I. M. Johnst. Proc. Calif. Acad. Sci. IV, 12: 1154. 1924.

*L. barbinodum* Miers, Ann. & Mag. Nat. Hist. II, 14: 138. 1854, and Ill. S. Amer. Pl. 2: 115, pl. 68E. 1857; Gray, Proc. Amer. Acad. 6: 47. 1862, and Syn. Fl. N. Amer. ed. 2, 2: 239. 1886; Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882.

Stems very leafy; leaves 10-30 mm. long, nodes sometimes cottony; flowers numerous, corolla 6-8 mm. long, the 4 (5) lobes  $\frac{1}{2}$  to nearly as long as the tube, reflexed; stamens about equal to, or slightly longer than corolla, much exserted.

Type: San Jose del Cabo, Baja California, coll. of 1899, *T. S. Brandegee* (C).

Distribution: Mexico, states of Baja California, Sonora, and Sinaloa.

Material seen:

MEXICO

BAJA CALIFORNIA: Todos Santos, Dec. 14, 1928, *Jones* 24111 (P), Jan. 28, 1890, *T. S. Brandegee* (C); Cape San Lucas, March 24, 1911, *Rose* 16418 (NY, US); San Jose del Cabo, Jan 19, 1928, *Jones* 24398 (MBG, P), coll. of 1898, *Grabendorffer* (C), Nov. 1902, *T. S. Brandegee* (C, US), coll. of 1899, *T. S. Brandegee* (C TYPE), Nov. 1, 1899, *T. S. Brandegee* (C), Apr. 30, 1891, *T. S. Brandegee* (C), Sept. 16, 1890, *T. S. Brandegee* (C), Sept. 19, 1890, *T. S. Brandegee* 417 (C); from Tres Pachitas to Valle Flojo, Dec. 25, 1905, alt. 700 m., *Nelson & Goldman* 7350 (MBG, US); from Cerro Colorado to Rodriguez, Dec. 16, 1905, alt. 300 m., *Nelson & Goldman* 7327 (US).

SONORA: hills and ravines, Guaymas, Sept. 1887, *Palmer* 230 (C, G, NY, US); Hermosillo, Oct. 26, 1926, *Jones* 22517 (MBG, P).

SINALOA: San Blas, Feb. 1, 1927, *Jones* 23102 (MBG, P); Monterey, coll. of 1878, *Parry* 12 (G).

WITHOUT LOCALITY: northwestern Mexico, *Seemann*, TYPE collection *L. barbinodum* (G, KEW).

The greatly reflexed lobes of the corolla and the large leaves are the important characteristics of this variety. Brandegee's type is a very close match for the type of *L. barbinodum*. Miers' plate of his species (*L. barbinodum*) does not match the type collection, and as Gray (*l. c.*) pointed out, neither does the plate match the description.

20d. *L. Berlandieri* var. *brevilobum* C. L. Hitchcock, var. nov.<sup>11</sup>  
Pl. 15, figs. 13-15.

Glabrate, practically unarmed; branches straight, leaves spatulate, 3-15 mm. long, 1-1.5 mm. broad, in fascicles of 2-5, these 2-7 mm. apart; pedicels 2-6 mm. long; corolla-tube funnelform,  $\frac{1}{2}$ -1 mm. in diameter, abruptly flared at top, the 5 lobes 1 mm. long, not reflexed; stamens slightly exserted.

Type: Conception del Oro, Mexico, Aug. 11-14, 1904, *Palmer* 285 (MBG).

Distribution: southern Texas and the neighboring state of Zacatecas, Mexico.

Material seen:

UNITED STATES OF AMERICA

TEXAS: Presidio del Norte, on the Rio Grande, *Bigelow* (NY); Upper Tarlinga Creek, W. Texas, Sept. 1883, *Havard* (F, US).

MEXICO

ZACATECAS: plains, Cedros, Aug. 1908, *Lloyd* 137 (US); near Conception del Oro, Aug. 11-14, 1904, *Palmer* 285 (C, F, MBG TYPE, NY, US).

The following numbers are intermediate between the variety and the species: Uvalde, Uvalde Co., Texas, May 9, 1918, *E. J. Palmer* 19537 (MBG); on mesa n. e. base of Quitman Mts., near

<sup>11</sup> *L. Berlandieri* var. *brevilobum* C. L. Hitchcock, var. nov., glabrum, minus spinosum; ramis rectis; foliis spatulatis, 5-15 mm. longis, 1-1.5 mm. latis, 2-5-fasciculatis; pedicellis 2-6 mm. longis; corollae tubo infundibuliformi, 0.5-1 mm. in diametro, ad verticem dilatato, lobis 1 mm. longis. Collected near Conception del Oro, Zacatecas, Mexico, Aug. 11-14, 1904, *Palmer* 285 (Missouri Botanical Garden Herbarium, no. 127336 TYPE, C, F, NY, US).

Sierra Blanca, Hudspeth Co., Texas, July 4, 1921, *Ferris & Duncan* 2511 (CA, MBG, NY, S); Presidio, western Texas, coll. of 1881, *Havard* 154, 155 (G, PA); mountains west of Saltillo, Coahuila, Mexico, Aug. 14–17, 1880, *Palmer* 955 (G, PA, US).

This conspicuous little variety seems almost to deserve specific recognition, but because of the prevalence of so many intermediate forms and the undependability of the number of the corolla-lobes as a taxonomic criterion in this genus, it is perhaps best treated as a variety.

The following collections have peculiar narrow, pallid leaves, and a characteristic appearance, and should probably be distinguished from the species by some minor category, but because of lack of flowers on all material studied, the writer is loath to follow such a procedure.—

#### UNITED STATES OF AMERICA

ARIZONA: Fish Creek, Apache Trail, Oct. 29, 1928, *Eastwood* (CA); Catalina Mts., Sabino Canyon, Aug. 18, 1903, alt. 1000 m., *Jones* (MBG, US); San Tan Mts., Sept. 28, 1925, *Peebles, Harrison & Kearney* 144 (US); Tucson, Laboratory Hill, June 21, 1904, *Coville* 1896, 1897 (US); Tucson Mts., Oct. 1901, *Thornber* (US); Tucson Mts., near Tucson, Jan. 3, 1903, *Thornber* 499 (US); Santa Rita Mts., Aug. 24, 1903, alt. 1500 m., *Jones* (P); fenced area, Santa Rita Forest Reserve, March 31–Apr. 23, 1903, *Griffiths* 3908 (US); fenced area, Santa Rita Forest Reserve, Sept. 27–Oct. 4, 1903, *Griffiths* 5955 (US); Santa Rita Range Reserve, Sept. 16, 1912, *Wooton* (US); Phoenix, May 6, 1903, alt. 300 m., *Jones* (P).

#### MEXICO

SONORA: New Year's Mine, 20 miles from Hermosillo, Oct. 28, 1926, *Jones* 22518 (P).

21. *L. Richii* Gray, Proc. Amer. Acad. 6: 46. 1862; Syn. Fl. N. Amer. ed. 2, 2: 238, 437. 1886; Abrams, Fl. Los Angeles & Vic. 323. 1917; David. & Moxl. Fl. S. Calif. 321. 1923; I. M. Johnst. Proc. Calif. Acad. Sci. IV, 12: 1153. 1924; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924 (exclusive of *L. Pringlei*); Jepson, Man. Fl. Pl. Calif. 891. 1925, in part.

Pl. 15, figs. 25–26.

*L. Berlandieri*  $\beta$  *Miersii* var. *Palmeri* subvar. *Richii* Terrac. Malpighia 4: 521. 1891.

*L. Palmeri* Gray, Proc. Amer. Acad. 8: 292. 1870, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238. 1886; Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882.

*L. Berlandieri*  $\beta$  *Miersii* var. *Palmeri* (Gray) Terrac. l. c.

*L. cedrosense* Greene, Pittonia 1: 268. 1889; Standl. l. c. 1288, exclusive of *L. Andersonii* var. *pubescens*.

*L. carolinianum*  $\beta$  *sandwicense* var. *cedroense* Terrac. l. c. 518 (should be var. *cedrosense* (Greene) Terrac.).

An erect, spreading or somewhat clambering, much branched, spiny shrub 1-3 m. tall, sometimes forming rather dense thickets; branches tan, sometimes gray, pubescent when young, but soon glabrous, often flexuous, the spines thick, sharp; leaves elliptic, obovate, or more commonly, spatulate, 5-15 (30) mm. long, 3-10 mm. broad, acute to rounded, sessile to short-petiolate (1-2 mm.), glabrate to densely pubescent, thick and fleshy; pedicels 1-10 mm. long; calyx campanulate, glabrate or pubescent, 2-6 mm. long, 2-4 (6)-lobed, the lobes variable, from triangular and less than  $\frac{1}{2}$  as long as the calyx-tube, to linear or spatulate and as long as or longer than tube, the tube rather strongly angled from base to apex of each lobe; corolla-tube campanulate to tubular, pink or violet, often with black stripes in throat, 4-9 mm. long, 4-, less commonly 5-6-, lobed, the lobes spreading, oval,  $\frac{1}{3}$  as long to nearly as long as tube, margins sometimes slightly ciliolate; stamens about equal to corolla-lobes, hence usually exserted 3-5 mm. from corolla-tube, anthers about 1 (2) mm. long, filaments subequal, adnate to about midway on corolla-tube, sometimes slightly less, base of free portion nearly or quite glabrous, but densely pilose for 1-2 mm. just above this point, adjacent corolla-tube also hairy, but much less so below point of adnation; stigma equaling or slightly exceeding stamens; berry ovoid, 2-lobed, 4-6 mm. thick, with 30-50 seeds.

Type: La Paz, Baja California, Major Rich (NY).

Distribution: Colorado Desert and southern coast of southern California, southward the length of Baja California, and eastward to Sonora, Mexico.

Material examined:

UNITED STATES OF AMERICA

CALIFORNIA: without locality, Fitch (NY); Colorado Desert,

sandy desert, Dos Palmas Spring, Riverside Co., Jan. 31, 1926, *Munz* 9964 (P); Coyote Wells, Jan. 24, 1890, *Orcutt* 2020 (MBG, US); Fig Tree John's, west shore of Salton Sea, March 19, 1917, *McGregor* 2050 (S); Yaqui Well, western edge of Colorado Desert, Feb. 8, 1925, *Jaeger* (G, P); near Fish Traps, Imperial Co., Dec. 22, 1925, *Jaeger* (P); in arenis, Dos Palmas, March 30, 1922, *Spencer* 2048 (MBG); Signal Mt., Imperial Co., Dec. 29, 1907, *Abrams* (G, NY, S); Palm Springs, Riverside Co., coll. of 1902, *Gilman* 24, suggestive of hybrid between *Richii* and *Andersonii* (C); Indio, Apr. 27, 1906, *Jones* (CA, P, S); Indio, June 10, 1907, *Bailey* (US); central part of Borrego Valley, western Colorado Desert, San Diego Co., Nov. 25, 1927, *J. T. Howell* 3210 (CA, S); Borrego Spring, Apr. 19, 1906, *Jones* (P); Borrego Wells, San Diego Co., Apr. 13, 1913, *Eastwood* (CA); near Salton Sea, Colorado Desert, Feb. 25, 1927, *Feudge* 1831 (P); San Clemente Is., Oct. 1902, *Trask* 28 (US).

#### MEXICO

BAJA CALIFORNIA: without locality, *Diguet* (NY); northern Lower California, May 13, 1882, *Orcutt* (US); Lower California, Apr. 1882, *Parry* (G, MBG, S); Lower California, coll. of 1883, *Parry* (F, MBG); 10 kilom. n. of Ensenada, Sept. 12, 1929, *Wiggins & Gillespie* 4011 (CA, MBG); Mulege, June 1887, *Palmer* (C, G, NY, US); near beach 5 mi. below Ensenada, alt. 2 m., March 29, 1925, *L. Ballou* (C, P); near Ensenada, Apr. 10, 1882, *Jones* 3714 (CA, MBG, NY, P, S, US); south of Ensenada, July 5, 1922, *Fleming* 1 (CA); near Colnet, Dec. 29, 1924, *Jones* (P); Pescadero, Nov. 1902, *T. S. Brandegee* (C, US); Isla Raza, Apr. 21, 1921, *Johnston* 3215 (CA); Ildefonso Is., May 17, 1921, *Johnston* 3747 (C, CA, G, MBG, NY, US); San Ramon, May 10, 1886, *Orcutt* (MBG); Comondu, Nov. 7, 1905, alt. 200 m., *Nelson & Goldman* 7269 (MBG, US); Rosarito, Sept. 25, 1905, alt. 100 m., *Nelson & Goldman* 7163 (US); Los Angeles Bay, May 6, 1921, *Johnston* 3425 (CA); San Felipe Bay, Feb. 1904, *MacDougal* (NY); San Felipe (near sea-level), June 20, 1905, *Goldman* 1163 (US); Magdalena Bay, coll. of 1925, *Mason* 1918 (CA, NY, S); Magdalena Is., Jan. 13, 1889, *T. S. Brandegee* (C); Agua Verde, Apr. 1, 1911, *Rose* 16586 (NY, US); San Francisquito Bay, Apr. 10, 1911, *Rose* 16759 (NY, US); Cedros Is., June 4, 1925, *Mason* 2014 (CA).

G); Cedros Is., Apr. 7, 1897, *T. S. Brandegee* (C); Cedros Island, Apr. 6, 1897, *T. S. Brandegee* (C); Cedros Is., March 10, 1911, *Rose 16108* (NY, US); La Paz, Feb. 3, 1906, *Nelson & Goldman 7487* (MBG, US); La Paz, Apr. 12, 1921, *Johnston 3061* (CA, G, US); La Paz, Nov. 8, 1926, *Jones 22516* (P); La Paz, Apr. 11, 1921, *Johnston 3027* (CA); La Paz, South. Calif., *Major Rich* (NY TYPE *L. Richii*, G); La Paz, Nov. 5, 1890, *T. S. Brandegee* (C); La Paz, June 14, 1897, *Rose 1310* (US); San Geronimo Is., March 15, 1897, *T. S. Brandegee* (US); San Quentin Bay, June 7, 1925, *Mason 2048* (CA); San Quentin, May 22, 1889, *T. S. Brandegee* (C); San Pedro Martir Is., Gulf of Mexico, Apr. 18, 1921, *Johnston 3154* (C, CA, G, NY, US); Isla Partida, Gulf of Mexico, Apr. 22, 1921, *Johnston 3233* (CA); San Jose del Cabo, Nov. 2, 1890, *T. S. Brandegee 418* (C, PA); San Martin Is., June 8, 1925, *Mason 2073* (CA); San Martin Is., Aug. 13, 1905, *Nelson & Goldman 7105* (US); San Martin Is., March-June, 1897, *Anthony 215* (C, G, MBG, US); San Martin Is., July-Oct. 1896, *Anthony 25* (F, G, MBG, NY, P, PA, US); Ascension Is., Apr. 17, 1897, *T. S. Brandegee* (C, G); Santa Rosalia, Feb. 24-March 3, 1889, *Palmer 183* (F, G, US); Santa Rosalia, Nov. 4, 1926, *Jones 22597* (P); All Saints' Bay, March 1882, *Parry & Pringle* (G); All Saints' Bay, Jan. 8, 1883, *Parry 12* (G); All Saints' Bay, May, 1882, *Fish* (G); Todos Santos Is., March 9, 1897, *T. S. Brandegee* (C).

**SONORA:** Yaqui River, coll. of 1869, *Palmer*, TYPE collection *L. Palmeri* (G TYPE, NY, US); Libertad, Oct. 15, 1923, *MacDougal & Shreve 21* (US); island in harbor, Guaymas, March 10, 1910, *Rose, Standley & Russell 12558* (NY, US); Guaymas, June 5-11, 1897, *Rose 1256* (US); alkali bottoms, Guaymas, June, 1887, *Palmer 71* (G, NY).

**SINALOA:** without locality, coll. of 1925, *Ortega 5561* (US); Altata, vicinity of Culiacan, Sept. 2, 1904, *T. S. Brandegee* (G); Altata, June 15, 1897, *Rose 1341* (G, NY, US).

The type is very similar to most of the material from the vicinity of La Paz, and matches the plant collected at Magdalena Bay, Lower California, in 1925, by H. L. Mason, no. 1918. The calyx-lobes are about equal to the tube, or may be much shorter, there being much variation in this plant in this respect. The corolla is

usually 4-lobed, and is much expanded near the summit in some instances.

As cited above, the species includes plants showing a wide range of variation. The length of the calyx-lobes, elsewhere usually a fairly constant character in the genus, varies greatly here, as does the length of the corolla-lobes. In spite of the variation within the group, it is not difficult to distinguish *L. Richii* from other members of the genus, as the spatulate fleshy leaves and the long oval corolla-lobes are distinctive. The linear or spatulate calyx-lobes, when present, immediately place the plant in this species, as the only other North American species having lobes that are at all similar are *L. macrodon* and *L. Parishii*, but the fruit of the former and the corolla of the latter cannot be confused with this species. The dense mass of hairs near the base of the free portion of the filaments, and the coastal range are also of help in placing plants in this species.

In general, the material from the islands off the coast of southern California has much longer calyx-lobes than that from Lower California, and the plants are more slender, with a tendency to be clambering. There appears to be sufficient difference to maintain these plants as a variety. Where plants with this type of corolla merge with those of Lower California (forms with much shorter calyx-lobes) there is every degree of intergradation. All evidence indicates that there are many local strains developed throughout the range of the species, some of which may be considered to be geographic entities, the insular forms constituting the variety *Hassei* being the most striking example. Plants from the Colorado Desert, while having calyx-lobes nearly as long as those of the variety, are much more compact and have longer pedicels. Those plants growing in the northern portion of Lower California are sometimes densely pubescent; therefore, if the extreme cases only were taken into consideration it would be possible to split the group into about four varieties.

Although the type of *L. cedrosense* has not been seen, the description indicates that the species belongs with this group. The "sharp angle running from base of tube to the apex of each of the 5 broad-triangular teeth" fits the material of *L. Richii* from Cedros Island. The plant collected on this island June 4, 1925, *Mason*

2014, matches the description of *L. cedrosense* very closely, but falls well within the range of variation of *L. Richii*, the calyx-lobes, leaves, pubescence, corolla-lobes, and fruit all indicating this relationship.

Johnston<sup>12</sup> stated that *L. brevipes* and *L. cedrosense* are the same species. Were this definitely proven, the name *L. Richii* would have to be replaced by that of *L. brevipes*. It seems to the writer, however, that there is not sufficient evidence to warrant such a change, as Bentham's description is not adequate to merit such a conclusion, and the evidence from Miers'<sup>13</sup> description and plate of the same plant is not enough to make such identity certain, the calyx and the corolla-lobes being too small. Therefore, it is not deemed advisable to replace the name *Richii*, which is well established and understood.

In discussing the relationships of *L. Richii*, Johnston expressed his belief that the species is most closely related to *L. californicum*; however, the fruits of the two species are so totally unlike that it is certain that their relationship must be exceedingly distant.

21a. *L. Richii* var. *Hassei* (Greene) I. M. Johnst. Proc. Calif. Acad. Sci. IV, 12: 1154. 1924; Jepson, Man. Fl. Pl. Calif. 891. 1925, in part.

Plate 15, figs. 22-24.

*L. Hassei* Greene, Pittonia 1: 222. 1888.

*L. carolinianum* γ *californicum* forma *Hassei* (Greene) Terrac. Malpighia 4: 518. 1891.

*L. Richii* Gray in Bailey, Cycl. Hort. 4: 1930. 1916; Millsp. & Nutt. Fl. Santa Catalina Island, 218. 1923.

Plant as much as 6 m. tall, almost unarmed; branches slender, flexuous; leaves glabrate or sparsely pubescent; calyx-lobes 1-3 times as long as the tube, spatulate.

Type: Santa Catalina Island, Los Angeles Co., California, July 15, 1888, *Hasse* & *Lyon* (Herbarium Greeneanum, at Notre Dame University).<sup>14</sup>

Distribution: islands off the coast of southern California, and from Santa Barbara and Los Angeles, where it is almost certainly

<sup>12</sup> Johnst. Proc. Calif. Acad. Sci. IV, 12: 1154. 1924.

<sup>13</sup> Miers, Ill. S. Amer. Pl. 2: 117, pl. 69C. 1857.

<sup>14</sup> The presence of this type in the Greene Herbarium was verified by Mr. Theodor Just, Assistant Curator there.

cultivated; from San Diego, where it may occur as a member of the native flora. Possibly now extinct as a native plant.

Material seen:

UNITED STATES OF AMERICA

CALIFORNIA: Isthmus, Catalina Is., July 6, 1909, *Pendleton* 1421 (C, F); Catalina Is., Sept. 15, 1894, *Toumey* 487 (F); Santa Catalina Is., Sept. 15, 1894, *Toumey* (C, NY); Catalina Is., June, 1886, *Trask* 500 (F); Avalon, Santa Catalina Is., Apr. 1896, *Trask* (US); Avalon, Santa Catalina Is., June, 1896, *Trask* (NY); Avalon, Santa Catalina Is., Nov. 1896, *Trask* (C, MBG); Santa Catalina Is., May, 1889, *T. S. Brandegee* (C, P); Avalon, dry wash, March 30, 1900, *Grant* 12469 (S); Catalina Is., Apr. 21–26, 1904, *Grant & Wheeler* 739a/6151 (C, S); Santa Catalina Is., *Greata* 6157 (C); Catalina Is., July 15, 1888, *Hasse* 4155 (F); Santa Catalina Is., July 15, 1888, *Hasse*, probably TYPE collection (G, NY, S, US); Santa Catalina Is., Dec. 1895, *Hasse* (S); Avalon, Santa Catalina Is., *Knopf* 509 (F); Avalon, Santa Catalina Is., Sept. 8, 1893, *McClatchie* 514 (F); Santa Barbara, Oct. 1923, *Walther* (CA); Blakesley Garden, Santa Barbara, Aug. 12, 1930, *Hoffmann* (SBM); Exposition Park, Los Angeles, Aug. 1916, *Eastwood* (CA); San Diego, July, 1895, *Stokes* (S). The following collections are very close to the var. *Hassei*, although not typical—San Diego, June 17, 1918, *Mrs. T. S. Brandegee* 907 (F, G, NY, P); dunes by sea, San Clemente Is., June, 1903, *Trask* 331 (NY, US); San Clemente Is., June, 1903, *Trask* 332 (NY, US).

22. *L. verrucosum* Eastwood, Proc. Calif. Acad. Sci. III, 1: 111. 1898; David. & Moxl. Fl. S. Calif. 321. 1923. Pl. 16, figs. 4–6.

An intricately branched, compact, sparingly spinescent shrub 1–3 m. tall; branches short, heavy, armed with few thick, blunt spines, dull tan, scurfy-pubescent, soon becoming glabrous; leaves scurfy-pubescent, spatulate, 5–10 mm. long, 3–6 mm. broad, contracted rather uniformly at the base, short-petioled; pedicels 4–8 mm. long, pubescent; calyx campanulate, about 4 mm. long and  $\frac{1}{2}$  as wide, irregularly 3–4-lobed, the lobes narrowly lanceolate, not quite equalling the tube, pubescent; corolla lavender, tubular, narrow, slightly contracted above the ovary, 8–10 mm. long, 4–5-lobed, the lobes about  $\frac{1}{4}$  as long as the tube, spatulate, sparsely

ciliolate; stamens 3-5, filaments short, adnate to the tube of the corolla and to the basal portion of the corolla-lobes, glabrous, but adjacent upper portion of the corolla-tube hairy, anthers small, less than 1 mm. long; style slightly exceeding the stamens, the stigma thus sometimes slightly exserted beyond the corolla-lobes; ovary with 25-40 ovules, "immature fruit reddish."

Type: San Nicholas Island, California, "on arroyo cliffs, several localities," April, 1897, *Blanche Trask* (CA).

Distribution: known only from the type locality.

Material seen:

UNITED STATES OF AMERICA: San Nicholas Is., California, Apr. 1897, *Trask*, TYPE collection (CA TYPE, MBG, US); on arroyo cliffs, San Nicholas Is., Apr. 1897, *Trask* 60 (MBG, but not G).

In her description, Miss Eastwood places this species near *L. californicum*, but there seems to be only remote relationship with that species. The flowers of *L. verrucosum* are larger and the corolla-lobes are only about one-fourth as long as the tube, whereas in *L. californicum* they are equal to or but slightly shorter than the tube; furthermore, the latter species always has a four-lobed corolla.

The writer considers *L. verrucosum* to be very close to *L. Richii*, both species having much the same type of calyx, corolla, leaves, and "branches" which are "verrucose at leaf axils from downy tufts at base of petioles." The points of dissimilarity are the spatulate lobes of the corolla, the amount of pubescence within the corolla-tube, and the point of attachment of the anthers. It is a very peculiar species, and one of which the status is not at all clear. Some of the anthers, at least, appear to be sterile. Perhaps it is because the plants grow "in inaccessible erosions along the arroyos" that more collections have not been obtained; but the writer is inclined to believe that the plant which Miss Trask collected was a freak which had its origin from seeds of *L. Richii*, and that this plant was the only one of such a nature.

23. *L. elongatum* Miers, Ann. & Mag. Nat. Hist. II, 14: 136. 1854, and Ill. S. Amer. Pl. 2: 112, pl. 68A. 1857; Griseb. Abhandl. König. Ges. Wiss. Gött. 19: 217. 1874 (Pl. Lorent. 169. 1874).

Pl. 16, figs. 7-9.

*L. elongatum* var. *riojana* Hieron. ex Haum.-Merck, Anal. Mus. Nac. Buenos Aires 24: 416. 1913.

*L. confertum* Miers, Ann. & Mag. Nat. Hist. II, 14: 137. 1854, and Ill. S. Amer. Pl. 2: 113, pl. 68 C. 1857.

*L. floribundum*  $\beta$  *infaustum* var. *elongatum* (Miers) Terrac. Malpighia 4: 531. 1891.

*L. floribundum*  $\beta$  *infaustum* var. *confertum* (Miers) Terrac. l. c.

A rather intricately branched, well-armed, rigid shrub 1-2 m. tall; branches slender but not flexuous, well armed throughout, tan, fairly smooth, pubescent only when young; leaves 2-5 in a fascicle, linear to linear-spatulate, thin, 6-20 mm. long, 0.5-1.5 (3) mm. broad, glabrous, or less commonly minutely pubescent, rounded at apex, base long-attenuate; flowers few, borne singly at the nodes on pedicels 1.5-3 (4) mm. long; calyx very slender, cup-shaped, tube 2-3 mm. long,  $\frac{1}{2}$ - $\frac{2}{3}$  as broad, with 5 slender, acuminate lobes nearly equal to or rarely longer than the tube, glabrous or sparingly pubescent on the surface, margins densely white-ciliate; corolla very narrowly obconic, tube contracted above ovary, about 8 mm. long, 2 mm. in diameter at the summit, glabrous exteriorly (or with band of persistent hairs near base), lobes 5, about 1 mm. long, oblong-ovate, spreading, glabrous except for few cilia on their margins; stamens included, filaments decidedly unequal, long ones nearly equalling corolla-tube, shortest one scarcely half this length, adnate nearly  $\frac{2}{3}$  the length of the corolla-tube, sparingly short-pilose for about 1 mm. of their free portion, corolla-tube also pubescent between filament-bases and for nearly 2 mm. below this point, especially along the vascular strands running to the filaments, anthers scarcely 1 mm. long; style equalling longest stamens; berry ovoid, 3-4 mm. long, 8-10-seeded.

Type: in desertis salsuginosis intra Cordovam et Santiago de Tucuman, Argentina, Tweedie 1212 (British Museum).

Distribution: central and northern Argentina.

Material seen:

ARGENTINA: without locality, coll. of 1880, *Hieronymus* (US); Cajon del Rio Loro, Prov. Tucuman, Dept. Burruyacu, Jan. 12, 1924, *Venturi* 2501 (C); Vipos, Prov. Tucuman, Oct. 30, 1921, *Venturi* 1384 (US, in part); Tucuman, Tapia, Oct. 10, 1920, *Ven-*

*turi* 968 (MBG); Pinto, Prov. Santiago del Estero, Oct. 1892, *Kuntze* (NY); Altos Oeste Cordoba, May 9, 1897, *Stuckert* 2799 (D); "El Charco," Prov. Santiago del Estero, Oct. 25, 1929, *Venturi* 9702 (G, MBG); Cordoba, San Javier, July, 1922, *Hauman* (MBG); Cordoba, *Kuntze* (NY); Cordoba, Nov. 23, 1880, *Hieronymus* (D); Estancia Germania pr. Cordoba, June-Dec. 1874, *Lorentz* 30 (D); Cordoba, Oct. 1871, *Lorentz* 131 (G); Cordoba, coll. of 1873, *Lorentz & Hieronymus* (NY); Cordoba, Dec. 16, 1880, *Galander* (KEW); Puebla Cordoba, June 1, 1913, *Curran* 95 (US); La Rioja, General Roca, San Francisco, July 16, 1928, *Gomez* (MBG).

As Miers pointed out, the corolla of *L. elongatum* resembles that of *L. cestroides* in some respects. However, the corolla-lobes are much less pubescent, and the leaf character alone is sufficient to distinguish the two. From Miers' description and plate, it seems certain that *L. confertum* is only a variation of *L. elongatum*—material examined has leaves much like that pictured for the former species. The linear-lobed calyx, narrow, 5-lobed corolla with unequal, included stamens adnate above the middle of the tube, and the pubescence on the corolla-tube below the point of adnation of the filaments are all very striking characters and make a decidedly unusual combination, yet they are common to both of his species. In fact, the only difference he shows is the narrower leaves and external pubescence on the corolla of *L. confertum*. None of the material examined has this pubescence, but notwithstanding, it seems certain that the two species are very closely related, if not conspecific, and they are therefore treated as identical. It might be noted that Miers described *L. confertum* as having a calyx-tube three-fourths of a line long with segments one and one-fourth lines long, but his plate shows a calyx with lobes scarcely as long as the tubular portion.

*Hieronymus*<sup>55</sup> described a hybrid between *L. cestroides* and this species. Careful examination of one of his plants of this supposed hybrid nature (Cordoba, pr. urbem, Nov. 23, 1880) seems to indicate that he was correct in his deductions. The supposed hybrid has oblong-oblanceolate leaves 2-3 cm. long, 4-6 mm. broad (intermediate between *L. cestroides* and *L. elongatum*), the corolla-

<sup>55</sup> *Hieronymus*, Bol. Acad. Cienc. Cord. 4<sup>1</sup>: 1, figs. 1-16. 1881.

lobes are much more ciliate than in *L. elongatum*, although not tomentose as in *L. cestroides*, the calyx is that of *L. elongatum*. On the whole, due largely to the spiny nature of the plant, it resembles *L. elongatum* and was so labelled by Hieronymus when collected; however, the leaves are so unlike that species and the other characters are so nearly intermediate between the two supposed parents that it is reasonable to regard it as a hybrid.

Other collections of this nature are: Cordoba, Argentina, Feb. 18, 1881, *Hieronymus* (NY); Cordoba, Argentina, Dec. 15, 1880, *Hieronymus* (D, KEW, NY); Estancia Germanica prope Cordoba, June-Dec. 1874, *Lorentz* 30 (V).

24. *L. minutifolium* Remy in Gay, Hist. Chil. Bot. 5: 93. 1849, not Philippi; Miers, Ann. & Mag. Nat. Hist. II, 14: 134. 1854, and Ill. S. Amer. Pl. 2: 110. 1857; Reiche, Anal. Univ. Chil. 123: 396. 1908, and Fl. Chil. 5: 316. 1910. Pl. 16, figs. 16-20.

*L. chilense*  $\beta$  *rachidocladum* var. *minutifolium* (Remy) Terrac. Malpighia 4: 529. 1891.

*L. implexum* Miers, Ann. & Mag. Nat. Hist. II, 14: 133. 1854, and Ill. S. Amer. Pl. 2: 109, pl. 67E. 1857.

*L. chilense*  $\gamma$  *implexum* (Miers) Terrac. l. c. 530.

*L. horridum* Philippi, not Thunb., Fl. Atac. 43. 1860 (judging from description).

*L. chilense*  $\alpha$  *normale* var. *deserticum* Terrac. l. c. 528, in part, as to *L. horridum* Phil.

*L. crassispina* Philippi, Anal. Univ. Chile 91: 25. 1895; Reiche, Anal. Univ. Chil. 123: 397. 1908, and Fl. Chil. 5: 317. 1910.

*L. pachyclados* Philippi, Anal. Univ. Chil. 91: 26. 1895 (judging from description only).

*L. Rhudolphi* Speg. Anal. Soc. Cient. Arg. (Nov. Add. Fl. Patag.) 53: 168. 1902.

A very much branched, stout, spiny, pubescent shrub 0.5-1.5 m. tall; branches very numerous, thick, rigid, brownish-tan, spines confined chiefly to ends of branchlets; leaves elliptic to linear-spatulate, 2-10 mm. long, 0.5-2 mm. broad, somewhat succulent, more or less hirtellous, greenish or cinereous, 1-5 in a fascicle, the nodes very close together; flowers borne singly, pedicels 1-4 mm. long; calyx cup-shaped, 2-3 mm. long, irregularly

4-lobed, the lobes short, seldom over 0.5 mm. long, pubescence same as on the leaves, margins of lobes more thickly beset with hairs; corolla very narrowly tubular-obconic, glabrous without, tubular portion (7) 9-12 mm. long, 2.5 mm. in diameter at the summit, 1-1.5 mm. wide at top of ovary, lobes 4, spreading or recurved, ovate, 1-1.5 mm. long, their margins not ciliate; stamens usually exserted 1.5-2.5 mm. from corolla-tube, filaments adnate to about  $\frac{1}{3}$  way from base of corolla-tube, subequal, hairy for about the first 4 mm. of their free portion, corolla-tube also pubescent for 1-2 mm. below the point of adnation, anthers 1-1.5 mm. long; style longer or somewhat shorter than the stamens; mature fruit not seen, but ovary with several ovules.

Type: Prov. of Coquimbo, Chile, coll. of 1838, *Gay* (Paris).

Distribution: dry interior valleys of the Cordilleras of Chile, from Coquimbo northward to Atacama.

Material seen:

CHILE: Prov. Coquimbo, coll. of 1838, *Gay* (MBG, photograph of TYPE at Paris); Coquimbo, *Bridges* 1334, TYPE collection *L. implexum* (KEW); Cord. Copiapo, Nov. 1863, alt. 3000 m., *Pearce* (KEW); Atacama, Feb. 1888, *Philippi* (KEW); Sierra San Miguel, Prov. Atacama, Dept. Copiapo, upper part of Quebrada San Miguel, Oct. 8, 1925, alt. 2400 m., *Johnston* 4934 (G); vicinity of Potrerillos, lat.  $26^{\circ} 27'$  S, long.  $69^{\circ} 30'$  W, Oct. 23, 1925, alt. 2600 m., *Johnston* 4706 (G, ST); Calpichi, Varas in des. Atacama, *Philippi* (V).

The type of *L. implexum* agrees very well with a photograph of the type of *L. minutifolium* at Paris; this evidence, coupled with the fact that the descriptions of the two plants are very much alike, makes it seem certain that the two are conspecific. *Lycium implexum* is the same, in all respects, as collections compared with the type of *L. crassispina* by Dr. I. M. Johnston, and pronounced conspecific with that species. So far as the writer can judge, *L. pachyclados* and *L. horridum* of *Philippi*, not Thunberg (*L. Rhudolfii* *Spegazzini*) belong here. Reiche placed *L. Chanar* under *L. crassispina*, and on one of the sheets which Dr. Johnston compared with *Philippi*'s types he has indicated that he considers that *L. horridum*, *L. pachyclados*, *L. Chanar*, and *L. crassispina* are very similar, if not identical; however, the original description of *L.*

*Chanar* gives the length of the corolla-tube of that species as "5½-6 mm.," a character which, if correct, practically precludes the possibility of *L. Chanar* being the same as *L. minutifolium*.

The following plants differ from the foregoing collections somewhat, the corolla being but 7 mm. long and the stamens being slightly shorter than the corolla-tube:

CHILE: Prov. Atacama, Dept. Chafiaral, Quebrada de Porterillos, along old road between Encanche and town of Porterillos, Oct. 22, 1925, alt. 2400 m., *Johnston* 3662 (G); Sierra San Miguel, Quebrada Salto below Portezuelo de San Pedrito, Prov. Atacama, Dept. Copiapo, Nov. 5, 1925, alt. 3100 m., *Johnston* 4866 (G); Prov. Atacama, Dept. Copiapo, Cord. Rio Figueroa, Co. Paredones, Jan. 1926, alt. 3200 m., *Werdermann* 980 (C, CA, F, G, KEW, MBG, ST). They resemble the species so closely in general appearance, however, that the writer hesitates to give them varietal rank, although there appears to be some basis for such a procedure.

25. *L. distichum* Meyen, Reise um die Erde 1: 448. 1834  
(footnote). Pl. 16, figs. 24-26.

*L. (Grabowskia) distichum* Nees, Nov. Act. Acad. Caes. Leop. 19, suppl. 1: 389. 1843.

*L. scabrum* Nees, l. c. ?

*L. oreophilum* Wedd. Chlor. And. 2: 108. 1857.

*L. leiostemum* Wedd. l. c.

*L. divaricatum* Rusby, Bull. N. Y. Bot. Gard. 8: 117. 1912.

An open, much-branched, spiny, pubescent shrub, as much as 3 m. tall; branches rather slender, densely pubescent, tan in youth, glabrous and brown with age, spines slender, sharp, numerous on young shoots, older branchlets almost unarmed except for pungent apex; leaves oblong-ovate to linear-spatulate, rounded to acute, densely though minutely pubescent and mealy-glandular, 4-12 mm. long, 1-3 mm. broad, rather thick and apparently not fleshy, midnerve prominent, those at base of branchlets most commonly of the ovate type, borne singly or in 2's, those of younger branchlets and at apex more commonly approaching the linear-spatulate form, 1-3 in a fascicle, old nodes much enlarged; flowers few, borne singly at the nodes, pedicels 4-7 mm. long;

calyx campanulate, 3-4 mm. long, sparsely pubescent, the 5 lobes lanceolate, acute, about equal in length to the tube, sparsely ciliate, sinuses rounded; corolla obconic-tubular, tubular portion 11-13 mm. long, about 3 mm. in diameter at the apex, 1.5-3 mm. at base, pubescent externally in region of calyx-lobes, lobes (4) 5, partially erect or somewhat spreading, rounded, about 1.5 mm. long, margins not ciliate; stamens equal to corolla-tube or slightly longer, but usually appearing included due to ascending nature of corolla-lobes, filaments nearly equal, adnate below the middle of corolla-tube, pilose for 2 mm. above the adnate portion, corolla-tube pubescent also for 4 mm. below this free portion, especially along the vascular traces of the filaments; style equaling stamens, stigma nearly 1 mm. broad; berry reddish-purple, 6-10-seeded.

Type: Cordillera de Tacna, Peru, Meyen (Berlin).

Distribution: Cordilleras of southern Peru and northern Chile, possibly extending from Copiapo, Chile, to Yura, Peru.

Material seen:

CHILE: Copiapo, coll. of 1876, Meyen (KEW).

PERU: Yura, Aug. 10, 1901, alt. 8400 ft., Williams 2554, TYPE collection *L. divaricatum* (NY TYPE, US); Cord. Tacna, coll. of 1876, alt. 2000 m., Meyen (G—photograph of TYPE collection at Berlin); Dept. of Cuzco, Oct. 1839-Feb. 1840, Gay (MBG—photograph of TYPE *L. leiostemum* at Paris); Cordillera de Palca, Dept. of Tacna, coll. of 1854, Weddell (MBG—photograph of TYPE *L. oreophilum* at Paris).

The Meyen plant from Copiapo, Chile, is so like the photograph of the type collection at Berlin, even to the most minute detail, that the writer is inclined to suspect that they may be the same collection, the labels having been confused; especially does this possibility seem plausible since there are no other collections from within several hundred miles of Copiapo.

There are only a few leaves remaining on the type collection of *L. distichum* but they are identical with those leaves borne at the base of the branchlets in Williams' specimen, the type of *L. divaricatum*. Although there are fewer spines on Meyen's plant, some of the branchlets of *L. divaricatum* are also almost unarmed; the flowers in the two plants are identical, likewise the pubescence, the calyx-lobes, the size, shape, and lobing of the corolla, and

stamen and stigma length are in perfect agreement. As further evidence that the two plants are conspecific, it may be mentioned that the two types were collected but a few miles apart.

It seems certain that *L. oreophilum* should be placed here, the only real point of dissimilarity being that Weddell's species is described as four-merous, a character which does not have much significance in most species of *Lycium*. The type was collected in the same region as Meyen's type, and judging from the excellent photograph of Weddell's plant it is identical with *L. distichum*. *Lycium leiostemum* is referred here with some doubt, the photograph of the type being very similar to Meyen's plant in flower character, but the leaves are narrower, and if the filaments of Gay's plant (type of *L. leiostemum*) are really glabrate as the description says, it is probably a mistake to consider it as conspecific with *L. distichum*.

*Lycium distichum* is much like *L. fragosum*, differing mainly in that the leaves are somewhat larger, the corolla pubescent exteriorly, and stamens and style are longer. If the specimen of *L. distichum* at Kew really came from Copiapo, Chile, the two species would have almost identical ranges, a condition which would help to confirm the suspicion that they are probably the same species; however, if "Copiapo" is the wrong locality, *L. distichum* would appear to have a distinctive distribution, a fact which, coupled with the corolla and leaf characters, would provide sufficient basis for maintaining the two species.

Miers' statement concerning the generic status of *L. distichum*<sup>66</sup> was undoubtedly biased by his belief that the plant was a member of the *Bignoniaceae*; it is certain, however, that he had not seen the plant, as his remark "long simple distichous patent branches, terminating in a spine, indicate an opposition, not an alternation of its axils and leaves," is in direct contradiction to the note made by Meyen on the type collection which says "ramis spinosis alternis." The list of characters which Miers cited to show that the plant could not be a *Lycium*, namely, minute, non-fasciculate leaves, solitary, blue flowers, large funnel-shaped limb and small segments with included stamens, are all to be found in this genus. The leaves are neither minute nor non-fasciculate; however,

<sup>66</sup> Miers, Ann. & Mag. Nat. Hist. II, 14: 345. 1854.

most of them have been shaken off, and consequently there are not many of the nodes which still have more than one leaf.

26. *L. fragosum* Miers, Ann. & Mag. Nat. Hist. II, 14: 132. 1854, and Ill. S. Amer. Pl. 2: 108, pl. 67D. 1857.

Pl. 16, figs. 10-12.

*L. fagosum* Mueller in Walp. Ann. Bot. 5: 579. 1858.

*L. salsum*  $\alpha$  *normale* var. *fagosum* Terrac. Malpighia 4: 530. 1891 (should be *fragosum* (Miers) Terrac.).

*L. deserti* Philippi, Fl. Atac. 43. 1860; Reiche, Anal. Univ. Chil. 123: 396. 1908, and Fl. Chil. 5: 316. 1910; I. M. Johnst. Contr. Gray Herb. 85: 112. 1929.

*L. chilense*  $\alpha$  *normale* var. *deserticum* Terrac. l. c. 528, in part, as to *L. deserti* Phil.

*L. breanum* Philippi, Anal. Univ. Chil. 91: 23. 1895.

An open, spreading, sparingly pubescent shrub 1-2 m. tall; branches rather slender, straight, gray, armed with thick, sharp spines; leaves linear to spatulate, 2-15 mm. long, 0.5-1.25 mm. broad, densely short hirtellous-pubescent, cinereous, borne in fascicles of 3-8, somewhat fleshy, margins frequently revolute; flowers numerous, borne singly, very commonly pendulous, pedicels 3-7 mm. long, sparingly pubescent; calyx cup-shaped, 2.5-3.5 mm. long, tube with much same pubescence as the leaves, the 4 lobes nearly as long as the tube, acute, ciliate; corolla narrowly oboconic-tubular, tubular portion 11-12 mm. long, 2.5-3 mm. in diameter at summit, glabrous externally, lobes 4, oval, 1-1.5 mm. long, spreading, ciliate; stamens included or partially exserted, filaments equal or somewhat subequal, 1.5-2 mm. shorter than corolla-tube, adnate  $\frac{1}{2}$ - $\frac{1}{2}$  the length of the corolla-tube, or slightly less, pilose the first 2-3 mm. of their free portion, corolla-tube also slightly pubescent adjacent to and below the free portion of the filaments, anthers 1-1.5 mm. long; style 1-2 mm. shorter than stamens; berry not seen, but young ovary several-ovuled.

Type: Peru, Cuming 948 (British Museum), according to Miers' citation, but the cotype in the Kew Herbarium bears the following legend: "Cobija, Iquiqui et Arica, Peruviae meridionalis in 1831"—all three localities now within the boundaries of Chile.

Distribution: northern Chile, from Copiapo and the desert of Atacama to Arica.

## Material seen:

CHILE: locality uncertain, "summit of Marañon," Warscewicz (KEW); Nord-Chile, Pearce (V); Totoral, Prov. Atacama, Dept. Copiapo, Nov. 1924, alt. 30 m., Werdermann 472 (G, MBG, ST); vicinity of Aguada de Miguel Diaz, Prov. Antofagasta, Dept. Taltal, ca. 24° 35' S, Dec. 1-4, 1925, Johnston 5382 (G); Desert of Atacama, Chile, coll. of 1885-87, Geisse 40 (NY); Cobija, Iquiqui et Arica, coll. of 1831, Cuming 948, TYPE collection (KEW); Des. Atacama, Philippi (V).

*Lycium deserti* is placed here because of the similarity of Philippi's description to that of *L. fragosum* and because Johnston's plant from Taltal is said by the collector to be a good match for Philippi's plant. This collection is in fruiting condition, and it is therefore difficult to compare it with Miers' type collection, but there are no points of dissimilarity between them, except that the Taltal plant has larger leaves; however, Johnston has noted on the label that the leaves are larger on his plant than on that of Philippi's. *Lycium breanum* is placed here with some hesitancy, although the original description would indicate that it is conspecific with Miers' species.

*Lycium fragosum* differs from *L. implexum* in having shorter stamens and style, ciliate corolla-lobes, and longer calyx-lobes; from *L. distichum* it differs in that the stamens and style are shorter, and the corolla-tube is glabrous exteriorly; there is, however, the possibility that the two species are not specifically distinct.

27. *L. Gilliesianum* Miers, Ann. & Mag. Nat. Hist. II, 14: 344. 1854, and Ill. S. Amer. Pl. 2: 137, pl. 74B. 1857.

Pl. 16, figs. 21-23.

*L. floribundum*  $\beta$  *infaustum* var. *Gilliesianum* Terrac. Malpighia 4: 531. 1891.

*L. rigidum* Gill. ex Miers, Ann. & Mag. Nat. Hist. II, 14: 344. 1854, and Ill. S. Amer. Pl. 2: 137, pl. 74B. 1857, not *L. rigidum* Thunb.

*L. longiflorum* Philippi, Anal. Univ. Chil. V, 21: 403. 1862, and Linnaea 33: 206. 1864.

*L. patagonicum*  $\beta$  *longiflorum* (Phil.) Terrac. l. c. 533.

*L. elongatum* Miers var. *longiflorum* (Phil.) Haum.-Merck, Anal. Mus. Nac. Buenos Aires 24: 416. 1913.

*L. Wilkesii* Ball, Jour. Linn. Soc. Bot. 21: 228. 1884.

*L. acanthocladium* Speg. Rev. Fac. Agr. y Vet. la Plata (Pl. Patag. Austr.) 3: 552. 1897.

A very leafy, somewhat branched, sparingly pubescent shrub 1-2 m. tall; branches slender, but not flexuous, very crooked, silvery-gray, spines thick; leaves 3-7 in a fascicle, linear-spatulate to narrowly oblanceolate, 8-20 mm. long, 1-3 mm. broad, somewhat fleshy, glabrous, except for a few cilia on margins, base long-attenuate; flowers 1-3 in the nodes, pedicels 2-5 mm. long; calyx small, cup-shaped, very sparingly pubescent, 2-2.5 mm. long, irregularly 4-lobed, the lobes  $\frac{1}{2}$  as long or as long as tube, ciliate; corolla very narrowly tubular-obconic, tube 13-17 mm. long, 2-2.5 mm. in diameter at the summit, about 1 mm. in diameter above the ovary, glabrous externally, lobes 4, rounded, 1.5 mm. long or less, recurved, their margins sparsely, if at all, ciliate; stamens 4, equal to tube, or very slightly exserted, filaments equal or subequal, adnate to slightly above the center of the tube, pilose at base of the free portion for about 1 mm., corolla-tube pubescent for nearly 5 mm. below this region, anthers slightly more than 1 mm. long; style 16-19 mm. long, thus exserted 2-4 mm.; berry ovoid, 4-7 mm. long, about  $\frac{1}{2}$  as thick, 5-10-seeded, basal disc very evident.

Type: Copuncoa, Mendoza, Argentina, Gillies (British Museum).

Distribution: central Argentina, from Terr. Rio Negro to Prov. Mendoza.

Material seen:

ARGENTINA: Chubut, Jan. 1904, Illin (MBG); entre el Jaguel y las Cortaderas, Cordillera de la Rioja, Feb. 21, 1879, Hieronymus & Niederlein 269 (D); vicinity of General Roca, Terr. Rio Negro, Sept. 1914-Feb. 1915, alt. 250-360 m., Fischer 112 (F, G, KEW, MBG, NY, US); Patagonia, coll. of 1850, d'Orbigny 183 (D); General Roca, Gobernacion del Rio Negro, Nov. 23, 1920, Wetmore 792 (US); Terr. Santa Cruz, Deseado, 1899-1900, Ameghino 26 (BA, identified as *L. acanthocladium* by Spegazzini); Naposte Grande, Sierras Pampeanas, Prov. Buenos Aires?, Feb.-Apr. 1881,

*Lorentz* (US), and from same locality, *Lorentz* 154 (US); Sierras Pampeanas, *Lorentz* (V); Copuncoa, Prov. Mendoza, *Gillies* (KEW TYPE collection); Carmensa, Prov. Mendoza, May 11, 1928, *Parodi* 8577 (G); Mendoza, Tupangato, Jan. 6, 1917, *Ruiz* (MBG); Mendoza, coll. of 1868-69, *Philippi*, photograph of supposedly authentic material of *L. longiflorum* at Berlin (G, MBG); Mendoza, *Philippi* (V, probably same collection as preceding); Terr. Santa Cruz, Oct. 6, 1929, alt. 400 m., *Donat* 176 (MBG); Buenos Aires, Tartido Carmen de Patagones, Feb. 1912, *Hauman* (MBG).

Although the type collection of *L. Gilliesianum* (*L. rigidum*) is without flowers, it is certain that it is the same species which Philippi later called *L. longiflorum*; the habit, leaves, calyx, and fruit of the two are identical, and the two types were both collected at Mendoza. *Lycium Wilkesii* may be placed here with reasonable certainty, as the original description fits that of *L. longiflorum* well. *Lycium Gilliesianum* has a shorter calyx-tube, shorter calyx-teeth, and a much longer corolla and stigma than does *L. elongatum*, with which it is perhaps most easily confused.

*Lycium acanthocladium* does not differ from *L. Gilliesianum* in any important character, judging from the description; because of this fact, and because the plant from Museo Nacional de Buenos Aires was identified by Spegazzini as *L. acanthocladium*, the writer believes Spegazzini's species can be unquestionably reduced to synonymy.

**27a. *L. Gilliesianum* Miers var. *longitubum* (Dammer) C. L. Hitchcock, comb. nov.**

*L. longitubum* U. Dammer in Engl. Bot. Jahrb. 37: 169. 1905.

Branches exceedingly thick; leaves pale green, thickly short-pubescent; calyx-lobes equal to the tube; corolla-tube slightly pubescent exteriorly, lobes 1.5-2 mm. long; stamens exserted 1 mm.

Type: Tambo in Quebrada del Toro, Prov. Salta, Argentina, Nov. 20, 1901, *Höfsten* 833 (ST).

Known only from the type collection, the plant from Stockholm being the only one seen. The variety is well marked, as the above diagnosis shows, yet the plant is so definitely and closely

related to *L. Gilliesianum* that it can be accorded no more than varietal rank.

28. *L. fuscum* Miers, Ann. & Mag. Nat. Hist. II, 14: 137. 1854, and Ill. S. Amer. Pl. 2: 113, pl. 68B. 1857; Griseb. Abhandl. König. Ges. Wiss. Gött. 19: 217. 1874. (Pl. Lorent. 169. 1874). Pl. 17, figs. 1-3.

*L. penduliflorum* I. M. Johnst. Physis 9: 318. 1929.

An erect, heavy, spiny, glabrous shrub 0.3-1.5 m. tall; branches exceedingly thick and rigid, gnarled, rough, gray-brown, armed with many pungent, thick, heavy branchlets, these usually with leaves at base; leaves oblong to obovate, glabrous, blades 5-10 mm. long, 4-6 mm. broad, rounded or obtuse at apex, rounded-attenuate at base, forming a petiole 2-5 mm. long; flowers borne singly on pedicels 3-4 (6) mm. long, pendent; calyx cup-shaped, only about 1.5 mm. long, and as wide, 4-5-lobed, the lobes nearly as long as the tube in some cases, acute, margins minutely ciliate, rest of calyx glabrous; corolla very narrowly obconic, tube yellowish-green, 15-18 mm. long, 2-2.5 mm. in diameter at top, less than 1 mm. in diameter just above ovary, glabrous, except the margins of the 4 lobes, these rounded, 1-1.5 mm. long, reflexed, ciliate; stamens 4, only partially exserted, filaments subequal, about equal to corolla-tube, adnate to about  $\frac{1}{6}$  the way from base of corolla-tube, pilose for nearly 2 mm. above adnate portion, adjacent corolla-tube pilose for 3 mm. below, anthers 1.5 mm. long, style about equalling stamens or slightly longer; ovary several-ovuled, but mature fruit not seen.

Type: ad San Pedro de Uspallata, in Andibus Provinciae Mendozae, Argentina, Miers (British Museum).

Distribution: northwestern Argentina, from Uspallata northward to northern San Juan.

Material seen:

ARGENTINA: Quebrada Ortiz, eastern part of Cordillera de Ortega, about lat.  $29^{\circ} 12'-21'$  S, long.  $69^{\circ} 38'-48'$  W, Jan. 14, 1926, alt. 3300 m., Johnston 6172 (G); vicinity of Baños San Crispin, about lat.  $29^{\circ} 11'$  S, long.  $69^{\circ} 44'$  W, Jan. 11, 1926, alt. 3300 m., Johnston 6120 (G TYPE of *L. penduliflorum*).

*Lycium fuscum* has the longest and slenderest corolla of any of

the New World species. It is closely related to *L. Gilliesianum* but differs from that species by the longer corolla, shorter style, ciliate corolla-lobes, pendent flowers, and obovate or oblong leaves. Although the type of *L. fuscum* has not been seen, the identity of this material is reasonably certain. Miers' plate and description were drawn from a specimen which consisted of but a few leaves and flowers, and his plate, as usual, cannot be relied upon too implicitly, since the flower drawn to natural size, and the one enlarged, are entirely different in shape. Those characters which are of unusual significance are the size and the shape of the leaves, the size and shape of the calyx, the length of the four fimbriate-margined lobes of the corolla, and the extent of adnation of the filaments. The nature of the leaves, in particular, is unusual, and, combined with the other common characters in the two plants, makes it seem fairly certain that Miers' and Johnston's species are the same. The types were collected in adjacent areas, which, according to Dr. Johnston, constitute a natural and to-be-expected range. The chief discrepancy between the two species is the shorter corolla in Miers' plant, but the disagreement of his figures indicates the possibility that there was some confusion of data.

29. *L. Andersonii* Gray, Proc. Amer. Acad. 7: 388. 1868; Bot. Calif. 1: 543. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239. 1886; Rydb. Fl. Rocky Mts. 758. 1917; David. & Moxl. Fl. S. Calif. 321. 1923; I. M. Johnston. Proc. Calif. Acad. Sci. IV, 12: 1155. 1924; Tidestrom, Contr. U. S. Nat. Herb. (Fl. Utah & Nev.) 25: 471. 1925; Jepson, Man. Fl. Pl. Calif. 890. 1925.

Pl. 18, figs. 8-10.

*L. Andersonii* var. *pubescens* Wats. Proc. Amer. Acad. 24: 65. 1889.

*L. cedrosense* Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1288. 1924, as to *L. Andersonii pubescens*.

*L. Parishii* Jepson, Man. Fl. Pl. Calif. 891. 1925, as concerns the Elsinore plants.

*L. Berlandieri*  $\gamma$  *longiflorum* var. *Andersonii* Terrac. Malpighia 4: 521. 1891.

A profusely branched, rounded, spiny shrub 0.5-3 m. tall,

glabrous or sometimes scurfy, rarely pubescent; young branchlets somewhat flexuous, silvery-white to tan, armed with numerous spines 5–20 mm. long, older branches often unarmed and with silvery-tan to dark brown bark; leaves linear-terete, ovoid or spatuloid, succulent, apex rounded to acute, somewhat attenuate at base, 3–15 mm. long, 1–2 (3) mm. broad, somewhat scurfy to subglabrous; flowers with pedicels 3–9 mm. long; calyx cup-shaped, 1.5–3 mm. long, usually 4–5-toothed, sometimes 2-lipped, teeth about  $\frac{1}{4}$  length of tube, glabrous to sparsely pubescent, margins of lobes sparingly ciliate; corolla tubular, gradually widening upward, tube 7–14 mm. long, 1–1.5 mm. in diameter at base, 2–3 mm. in diameter at top, dirty lavender, lobes 5, frequently 4, ovate in outline, 1.5–2.5 mm. long, finely ciliate, fimbriate, or simply entire, lavender or purple, fading to white, spreading; stamens about equalling corolla-tube or more commonly exserted 2–3 mm., filaments adnate about  $\frac{1}{3}$  the length of the corolla-tube, base with few scattered hairs above the point of adnation, glabrous or with few hairs below this region, anthers 1–1.5 mm. long; style about equalling corolla or exserted as much as 2–3 mm.; berry ovoid or ellipsoid, often somewhat attenuate, 3–8 mm. long, about  $\frac{3}{5}$  as thick, red, seeds light-brown, about 2 mm. long, very numerous.

Type: southeastern Nevada, coll. of 1866, *Anderson* 151 (G).

Distribution: from coastal southern California to western New Mexico, northward to central Utah, and southward to Baja California and Sonora, Mexico.

Material seen:

UNITED STATES OF AMERICA

WITHOUT DEFINITE LOCALITY: U. S. Pacific Slope, *Lemmon* (C); coll. of 1881, *Parry* 216½ (MBG); coll. of 1874, *Parry* 204 (MBG).

NEW MEXICO: 1 mi. S of Tularosa, Otero Co., June 15, 1930, alt. 1300 m., *Goodman & Hitchcock* 1137 (MBG); 8 miles e. of Deming, Sept. 1, 1908, *Goldman* 1459 (US); Playas Valley (La Cienega), Aug. 21, 1908, *Goldman* 1444 (US).

ARIZONA: without locality, coll. of 1881, *Parry* (MBG); Tinajas Altas, Nov. 20, 1913, *Goldman* 2315 (US); dry benches, Big Sandy River, near Owens, Sept. 20, 1917, alt. 600 m., *Goldman* 2958 (US); wash between Rice and Globe, Gila Co., June 6, 1918,

*Ferris* 1305 (S); Santa Rita Forest Reserve, Santa Cruz Co., Sept. 20–Oct. 4, 1902, *Griffiths & Thornber* 20 (US); Tucson, Pima Co., Sept. 2, 1867, *Dr. Smart* (MBG); Sabino Canyon, Sta. Catalina Mts., Jan. 6, 1920, *Bartram* 235 (PA); north slope of Santa Rita Mts., Pima Co., Sept. 29, 1904, *Griffiths* 6955 (MBG); Laosa to Lovare via Baboquivari, March 13–Apr. 23, 1903, *Griffiths* 3623 (US); foot of Salt River Mts., Maricopa Co., March 14, 1930, *Peebles* 6445 (US); opposite Double Buttes, Casa Grande-Gila Bend Rd., Feb. 23, 1931, *Peebles & Loomis* 7500, 7501, 7502 (P, SAC); Phoenix, Maricopa Co., Apr. 18, 1917, *Eastwood* 6172 (CA); Phoenix, May 6, 1903, alt. 300 m., *Jones* (P); Bowie, Cochise Co., Sept. 18, 1884, *Jones* 4276 (CA, C, D, F, NY, P, US); Camp Bowie, Aug. 1874, alt. 1700 m., *Rothrock* 448 (F, US); rocky washes, near Cameron, Coconino Co., June 8, 1922, alt. 1600 m., *Hanson* A129 (MBG); bank, N. of Colorado River at Lee's Ferry, Coconino Co., Aug. 27, 1909, *Nelson* 71 (US); Hermit Creek, Grand Canyon, Apr. 10, 1917, *Eastwood* 6015 (CA); Ft. Mojave on the Colo. R., Apr. 1894, *Lemmon* (C); Williams' Fork of the Colorado R., March 11, 1876, *Palmer* 421 (C, F, G, MBG, NY, PA, US); Peach Springs, Mohave Co., Apr. 1893, *Wilson* (C); near Oatman, Mohave Co., March 23, 1931, *Harrison, Kearney & Fulton* 7579 (SAC); Oatman-Kingman Rd., Mohave Co., March 23, 1931, *Harrison, Kearney & Fulton* 7611 (SAC); Big Sandy River, 45 miles s. of Kingman, Mohave Co., March 24, 1931, *Harrison, Kearney & Fulton* 7625, 7626, 7627 (SAC, P); Franconia, Mohave Co., Apr. 17, 1903, alt. 300 m., *Jones* (P, S); Kofa Mts., near Quartzite, Yuma Co., Dec. 29, 1929, *Hilend* 370 (UCLA); 30 miles E. of Parker, Yuma Co., March 21, 1931, *Harrison, Kearney & Fulton* 7526 (SAC, P); Parker Ferry, Yuma Co., March 22, 1931, *Harrison, Kearney & Fulton* 7527 (P, SAC); near northern base of Harqua Hala Mts., Yuma Co., March 21, 1931, *Harrison, Kearney & Fulton* 7523 and 7524 (SAC); Yucca, March 12, 1912, *Wooton* (US); Yucca, May 17, 1884, *Jones* (P, S); north of Yuma, Apr. 26, 1906, *Jones* (P).

UTAH: without locality, coll. of 1872, *Wheeler* (NY); Leavington, May 8, 1911, alt. 1600 m., *Jones* (P); Santa Clara Valley, Apr. 30, 1894, *Jones* 5139 (P, US); Diamond Valley, Apr. 27, 1894, alt. 1400 m., *Jones* 5125p (P, US); Salt Lake, June, 1869,

alt. 1400 m., *Watson* 942 (G, NY, US); Stansbury Is., June, 1883, *Jones* (P); Bird (Hat) Island, Great Salt Lake, June 11, 1916, *Garrett* (NY, GAR); St. George, coll. of 1877, *Palmer* 365 (G); rocky hills, near St. George, Apr. 1874, *Parry* 201 (D, F, G, MBG, NY, PA); St. George, Apr. 2, 1880, alt. 600 m., *Jones* 1624 (C, CA, NY, P, US), the plant in the Field Herbarium under this number is *L. Torreyi*; Beaverdam Mts., May 11, 1891, *Bailey* 1950 (US); Beaverdam Wash, March 18, 1905, *Gooodding* 2147 (C, G, MBG, NY).

**NEVADA:** without locality, coll. of 1872, *Wheeler* (US); southeastern Nevada in 1866, *Anderson* 151 (C, G TYPE, NY); Good Springs, Apr. 30, 1905, *Jones* (P); Mica Spring, Apr. 14, 1894, alt. 1300 m., *Jones* 5064as (P, US); Candelaria, Esmeralda Co., May 14, 1882, *Shockley* 205 (C, G); open sand, Candelaria, May 14, 1882, *Shockley* 219 (US); Rhyolite, Nye Co., Apr. 11, 1907, alt. 1200 m., *Jones* (P); Rhyolite, Apr. 25, 1907, alt. 1300 m., *Jones* (P); mesa, Alamo, Lincoln Co., May 18, 1919, *Tidestrom* 9559 (US); Erie, Clark Co., Apr. 8, 1919, alt. 935 m., *Tidestrom* 8864 (US); Las Vegas, May 5, 1905, *Gooodding* 2305 (G, MBG).

**CALIFORNIA:** western Arizona or southeastern California, coll. of 1876, *Palmer* (G); desert, near Agua Caliente (Palm Springs), Jan. 10, 1880, *Parish* 11 (G); Agua Caliente, March 10, 1881, *Parish & Parish* 730 (G); Vallecitos, Colo. Desert, Apr. 10, 1896, *T. S. Brandegee* (NY, PA, C in part, but not F); edge of sandy wash, vicinity of Corn Springs, Chuckwalla Mts., Colorado Desert, in Lower Sonoran, Apr. 9-12, 1922, alt. 400 m., *Munz & Keck* 4849 (P) and 4850 (C, P); Jurupa Mts., extreme w. end, rocky exposed situations on s. slopes, May 8, 1920, *Johnston* 2272 (P, US); San Felipe, Imperial Co., May, 1899, *K. Brandegee* (C, P); Colorado River Basin, 5 mi. n. of Laguna Dam, Apr. 19, 1930, *Hilend* (UCLA); Mountain Spring, Imperial or San Diego Co., Feb. 28, 1924, *Jones* (P); desert sand, Mt. Springs, 15 miles from Mexican border, Imperial Co., May 5, 1918, alt. 700 m., *Spencer* 798 (G, NY, P); Mono Lake, Mono Co., May 1922, *E. Wright* (CA); gravelly slope, Ryan to Shoshone, Inyo Co., Apr. 4, 1929, *Hoffmann* (SBM); Townsend Grade, Inyo Co., Apr. 26, 1930, *Hoffmann* (SBM); sandy soil, 5 mi. e. of Bradbury Well, Black Mts., Inyo Co., Apr. 2, 1928, *J. T. Howell* 3657 (CA); rocky wall,

Wild Rose Canyon, Inyo Co., April 2, 1929, *Hoffmann* (SBM); Silver Canyon in the White Mts., E. of Laws, Inyo Co., May 9, 1906, *Heller* (MBG); Death Valley, March 12, 1924, *Jones* (P); Funeral Mts., Death Valley, Apr. 10, 1907, *Jones* (P); Darwin Mesa, Inyo Co., May 23, 1891, alt. 1550 m., *Coville & Funston* 879 (US); Darwin, Apr. 27, 1897, alt. 1500 m., *Jones* (P, US); 6 miles from Darwin on Owen's Valley Road, June 11, 1930, *Ferris* 7904 (C); rocky alluvial slope, E. slope of Walker Pass, Kern Co., May 13, 1930, alt. 1300 m., *J. T. Howell* 4998 (CA); Red Rock Canyon, Kern Co., May 1, 1927, *Abrams* 11882 (P); Mojave, May 20, 1903, alt. 1000 m., *Jones* (P); Randsburg, Kern Co., Apr. 14, 1905, *Heller* 7704 (D, F, G, MBG, NY, PA, US); Randsburg to Mohave, Apr. 27, 1929, *Hoffmann* (SBM); Randsburg, Apr. 1905, *Drake* (C); 8 miles northwest of Hesperia, May 17, 1920, *Johnston* (P); Hesperia, San Bernardino Co., Apr. 15, 1892, *Trelease* (MBG); in desert sand, Barstow, Mohave Desert, Apr. 4, 1920, alt. 700 m., *Spencer* 1564 (P); "ad flumen Mohave proximus, prope Barstow, San Bernardino Co." May 2, 1922, alt. 1000 m., *Spencer* 2047 (G, PA); dry rocky hill, Barstow, Apr. 13, 1919, *Munz* 2606 (P); Red Rock, Barstow, Apr. 5, 1929, *Hoffmann* (SBM); Barstow, March 16, 1916, alt. 700 m., *Jepson* 6612 (G); north of and near Victorville, May 11, 1926, *Jones* (P); Victorville, March 13, 1927, *Hart* (CA); in desert sand, near Victorville, Apr. 19, 1918, alt. 600 m., *Spencer* 796 (G, NY, P); Victorville, Apr. 10, 1922, *Mrs. Jos. Clemens* (CA); sandy soil, halfway between Victorville and Hesperia, Mohave Desert, June 12, 1927, alt. 900 m., *J. T. Howell* 2528 (CA); Mohave R., southeastern California, May 1876, *Palmer* 426 (C, CA, F, G, MBG, NY, US); borders of the Mohave Desert, San Bernardino Co., May 31, 1892, *Parish* 2437 (F); Morongo, Apr. 1882, *Parish & Parish* 11A (G); Warren's Well, San Bernardino Co., May 16, 1909, *T. S. Brandegee* (C); Colorado River, opposite the Needles, March 3, 1910, *J. Grinnell* (C); Rock Spring, S. E. California, coll. of 1876, *Palmer* 418 (C, F, G, US); rocky slopes, Argus Mts., Apr.–Sept. 1897, *Purpus* 5427 (C, G, MBG, US); Kelso, May 2, 1906, *Jones* (P); Barnwell, May, 1911, *K. Brandegee* (C); rocky desert hills, vicinity of Bonanza King Mine, east slope of Providence Mts., Mohave Desert, May 21–24, 1920, alt. 800 m., *Munz*, *Johnston*

& Harwood 4026a (P); stony hills, Garlic Spring, Apr. 25, 1930, Hoffmann (SBM); granite rocks, dry lake bed, east of Muroc, San Bernardino Co., June 13, 1921, Ferris & Duncan 2209 (CA); Colton, coll. of 1881, Vasey (F, G, US); Cabezone (Cabazon, Riverside Co.?), Oct. 24, 1907, Bailey (US); Cabazon, March 1880, Parish & Parish 11 (F, US); Cañon de Los Negros, Apr. 1881, Parish & Parish 11 (PA); Lower Coahuila Creek, Riverside Co., March 29, 1898, alt. 600 m., Leiberg 3184 (US); sandy wash, south base of Eagle Mts., Riverside Co., Apr. 9, 1922, alt. 600 m., Munz & Keck 4811 (C, P); Palm Springs, March 6, 1922, Mrs. R. W. Campbell 35 (CA); dry slopes, Aguanga, Riverside Co., Apr. 29, 1922, alt. 700 m., Munz 5115 (C, P); dry canyon wall, Lower Sonoran, Andreas Canyon, March 12, 1922, Munz 4710 (P); Whitewater, March 11, 1903, alt. 300 m., Jones (P); Banning, coll. of 1904, Gilman 29 (C); Terquisquita Canyon, Riverside City, coll. F. M. Reed, Dec. 1917, Parish 11655 (C); Elsinore, Apr. 4, 1904, Baker 4145 (C, CA, D, F, G, MBG, NY, S, US); Acton, Los Angeles Co., June 1902, Elmer 3757 (D, G, MBG, NY, P, S, US); open desert, Palmdale, June 14, 1927, Hoffmann (SBM); desert flat, Roosevelt, Apr. 27, 1929, Hoffmann (SBM); dry plains, Antelope Valley, Apr. 6-8, 1917, Shaw, Spalding & Walton (P); Santa Monica, March, 1881, Parry 216 (MBG); Santa Monica, March, 1881, Parry 314 (US); Borrego Spring, San Diego Co., Apr. 19, 1906, Jones (P); near County Poor Farm, Mission Hills, San Diego, May 12, 1903, Abrams 3464 (F, G, MBG, NY, P); San Diego, March 9, 1882, Jones 3045 (US only); sandy soil, Aguanga, in the arid hills of interior San Diego Co., Nov. 27, 1927, J. T. Howell 3274 (CA); Jacumba, Apr. 1905, T. S. Brandegee (C, US); Jacumba Springs, Apr. 11-16, 1924, Eggleston 19809 (P); Chollas Valley, March 15, 1883, Orcutt (C, F); 3 miles east of Warren's Well, May 6, 1922, Munz & Johnston 5200a (P).

#### MEXICO

BAJA CALIFORNIA: without locality, coll. of 1883, Orcutt (G); coll. of 1882, Parry (MBG); Ensenada, Apr. 12, 1882, Jones (F), approaches the *f. deserticola*; San Felipe, sandy wash, Feb. 6, 1929, Hoffmann (SBM); San Felipe, May 1899, T. S. Brandegee (C); 15 miles south of San Diego, California, Apr. 5, 1882, Jones (G); dry Tia Juana River bank, July 28, 1912, Smith 5212 (F);

hills at Tia Juana, May 14, 1903, *Abrams* 3491 (NY, P); Tia Juana, May 28, 1883, *Orcutt* (C); northern Lower California, *Parry & Pringle* (G); Comondu, March 22, 1889, *T. S. Brandegee* (C), plant densely pubescent; San Antonio, June 3, 1893, *T. S. Brandegee* (C); Magdalene Is., Jan. 22, 1889, *T. S. Brandegee* (C); San Martin Is., March 13, 1897, *T. S. Brandegee* (C); La Paz, June 14, 1897, *Rose* 1314 (US); La Paz, Jan. 20–Feb. 5, 1890, *Palmer* 101 (F, G, NY, US), branches slender and flexuous; stony ravines, Los Angeles Bay, Gulf of California, Dec. 1887, *Palmer* 559, TYPE collection *L. Andersonii* var. *pubescens* (G TYPE, NY, US).

SONORA: Altar to Sasabe, Sept. 21–23, 1904, *Griffiths* 6921 (MBG).

SINALOA: vicinity of Fuerte, March 26, 1910, *Rose, Standley & Russell* 13555 (NY, US); La Constancia, coll. of 1924, *Ortega* 5520 (PA, US).

The following numbers approach the forma *deserticola*:—near Wittman, Arizona, March 30, 1930, *Peebles & Loomis* 6727 (US); on California side of Colorado River, near Parker Ferry, March 22, 1931, *Harrison, Kearney & Fulton* 7529 (SAC); Elsinore, Riverside Co., California, *Johnston* 2028 (C, G, P); San Diego, California, coll. of March, 1882, *Jones* (CA, MBG, NY, P).

These numbers are intermediate between *L. Andersonii* and *L. Andersonii* var. *Wrightii*:—on flats, near Magma, Pinal Co., Arizona, Feb. 28, 1930, *Peebles & Harrison* 6431 (MBG, SAC, P); "Saar de Cienega towards Chiricahui," Sept. 2, 1851, *C. Wright* 1610, in part (G).

Because of the fact that *L. Andersonii* has such an extended range, it is not surprising that it breaks up into several local, geographically isolated entities. The leaves are typically linear-spatulate and terete, glabrous, and rather succulent, but some are found that are almost obovate and more or less flattened. In some of the material from southwestern California, adjacent Arizona, and Lower California, such as the plant which Watson called *L. Andersonii* var. *pubescens*, considerable pubescence is present. Jones' collection from Franconia, Arizona, Apr. 17, 1903, is the other collection seen which is densely pubescent.

*Lycium Andersonii* has been most frequently confused with *L.*

*Torreyi*, from which it sometimes is distinguished with difficulty. The lanate condition of the corolla-lobes in the latter species is one almost infallible criterion, however. The following table sums up the differences:

<i>L. Andersonii</i>	<i>L. Torreyi</i>
Leaves linear-spatulate, seldom over 3 mm. broad.	Leaves elliptic to spatulate, usually over 3 mm. broad.
Corolla-lobes rounded, margins simply entire to ciliate.	Corolla-lobes obtuse to acute, margins densely white-lanate-ciliate.
Corolla-tube about 2 mm. in diameter at top	Corolla-tube usually over 2.5 mm. in diameter at top.

Several collections have been seen, such as, St. George, Utah, Apr. 2, 1880, Jones 1624 (F); near Dome, Yuma, Arizona, March 10, 1928, Peebles & Harrison 5045 (SAC); in desert sand, Palm Canyon, Riverside Co., California, March 27, 1918, Spencer 797 (NY, P), which appear to be hybrids of the two species. In such cases the whole plant may be almost exactly intermediate between the two species in leaf and corolla characters, or the suspected hybrid may have a corolla shaped like *L. Andersonii* with the lanate lobes of *Torreyi*, as well as having leaves like the latter species.

29a. *L. Andersonii* var. *Wrightii* Gray, Bot. Calif. 1: 543. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239. 1886. Pl. 18, figs. 11-12.

*L. Berlandieri*  $\gamma$  *longiflorum* var. *Andersonii* subvar. *Wrightii* (Gray) Terrac. Malpighia 4: 521. 1891.

Flowers small, 5-8 mm. long, usually 4-lobed; leaves small, elliptic-spatulate, 3-8 mm. long; stigma usually exserted 2-3 mm.

Type: probably "Saar de Cienega towards Chiricahui, Ariz." Sept. 2, 1851, C. Wright 1610 (G).

Distribution: southern Arizona and adjacent northern Mexico.

Material seen:

#### UNITED STATES OF AMERICA

ARIZONA: coll. of 1869, Palmer (G, NY, US); Camp Grant, July 10, 1867, Palmer 199 (G, MBG); "Saar de Cienega towards Chiricahui," coll. of 1851-52, C. Wright 1610, probably TYPE col-

lection (G TYPE, MBG, NY, US); Blue River, Greenlee Co., Sept. 8, 1902, *Davidson* 1013 (G); 6 miles south of Benson, June 20, 1930, *Goodman & Hitchcock* 1235 (MBG); adobe soil, vicinity of Benson, March 2, 1910, *Rose, Standley & Russell* 12302 (NY, US); near Sacaton, Aug. 11, 1926, Pinal Co., *Peebles & Harrison* 2723 (US); Oracle to Redington, March 13–Apr. 23, 1903, *Griffiths* 3751 (US); dry washes, Pinal Creek, Sept. 1, 1910, *Goodding* 714 (D, G, NY, US); foothills of the Santa Catalina Mts., Pima Co., July 28, 1881, *Pringle* (G, in part only); near Kits Peak, Baboquivari Mts., Pima Co., Aug. 1, 1916, alt. 1300 m., *Lutz* F4040E (NY); Fort Lowell, Pima Co., Nov. 11, 1893, *Holzner* 2649 (US); near Tucson, June, 1899, *Eby* (MBG); Tucson to Steam Pump, March 13–Apr. 23, 1903, *Griffiths* 3642 (US); Tucson, Aug. 17, 1903, alt. 700 m., *Jones* (P); Santa Cruz Valley, near Tucson, July 25, 1881, *Pringle* (D, F, NY, P, PA); mesas near Tucson, Sept. 7, 1884, *Pringle* (C, D, NY, PA); Tucson, June 16, 1855, *Schott* (F); Tucson, Nov. 3, 1893, *Toumey* (US); Tucson, Nov. 3, 1894, *Toumey* (C, CA, DL, NY, US); Range Reserve near Tucson, July 11, 1911, *Wooton* (US).

#### MEXICO

SONORA: Pinacate, Jan. 14, 1910, *Lumholtz* 29 (G).

The type of this variety is almost certainly C. Wright's number 1610, which, however, appears to consist of two different plants. One of them is *L. Andersonii*, the other is identical with the second number cited by Gray, "E. Palmer, in 1869," and is probably the plant which he had in mind when he drew up his varietal description. Gray cited this collection as "L. *Berlandieri* Dunal in DC." in Proc. Amer. Acad. 6: 47. 1862, thus indicating that he was somewhat puzzled as to its true status; this is not surprising, because, due to the small four-lobed corolla, this variety resembles *L. Berlandieri* very closely. However, the corolla-tube in *L. Berlandieri* is more enlarged toward the summit, and is usually shorter in proportion to the lobes.

Collections from Tucson, Arizona, have corollas as in this variety, the leaves, however, being much larger. Such plants do not seem to merit nomenclatural rank, and since they resemble the variety *Wrightii* in corolla characters, the writer has placed them here. Collections of this nature are:

## UNITED STATES OF AMERICA

ARIZONA: Casa Grande, Pinal Co., Oct. 3, 1930, Peebles 7389 (US); in wash, Sacaton Mts., Sept. 26, 1925, Peebles & Kearney 97 (SAC); Fresnal, Papago Indian Reservation, Pima Co., Oct. 11, 1925, Peebles, Harrison & Kearney 404 (SAC); Catalina Mts., Aug. 19, 1903, alt. 1300 m., Jones (P); Santa Cruz Valley, Tucson, Sept. 24, 1903, alt. 800 m., Thornber 33 (C, MBG, NY, P, US); mesa south of Tucson, Sept. 25, 1880, Engelmann (MBG); Willcox, Cochise Co., Aug. 9, 1909, Goldman 1615 (US); dry sandy roadside, Tempe, Maricopa Co., Aug. 24, 1901, Kearney 112 (MBG, US).

29b. *L. Andersonii* forma *deserticola* C. L. Hitchcock, nom. nov.

*L. Torreyi* var. *Wrightii* (Gray) Jepson, Man. Fl. Pl. Calif. 891. 1925.

Leaves 20-35 mm. long, 1-2 mm. broad, otherwise as in the species.

Type: Palm Springs (Agua Caliente), desert base of San Jacinto Mts., Riverside Co., California, April 4-13, 1896, S. B. Parish 4132 (MBG no. 127372).

Distribution: Colorado Desert of California and adjacent Arizona.

Material seen:

## UNITED STATES OF AMERICA

WITHOUT LOCALITY: coll. of 1876, Parry & Lemmon 270 (G, MBG).

ARIZONA: Wellerich Dome, Jan. 1916, Monnet 1098 (CA), Maricopa, May, 1885, A. Gray (G); near Hyder, Yuma Co., Feb. 1930, Peebles 6426 (US).

CALIFORNIA: near Old Dad Mt., Providence Mts., Mojave Desert, Apr. 13, 1930, Hilend 384 (UCLA); bluffs, ranch, Arroyo Terquisquita, Riverside Co., Feb. 12, 1907, Parish 1203 (S); Arroyo Terquisquita, Feb. 20, 1907, F. M. Reed 1203 (C); banks of the Arroyo Terquisquita, May 5, 1926, alt. 250 m., F. M. Reed 5289 (P); San Felipe Canyon, Colorado Desert, San Diego Co., Apr. 14, 1913, Eastwood 2641 (CA, G, US); near Shaver's Well, Colorado Desert, Feb. 16, 1926, Jones (P); Palm Canyon, Riverside Co., Nov. 26, 1921, Mrs. R. W. Campbell 12 (CA); Palm

Canyon, March 27, 1927, *Epling* (MBG); Palm Springs, Nov. 1925, *Merritt* (CA); Palm Springs (Agua Caliente), desert base of San Jacinto Mts., Apr. 4–13, 1896, alt. 200 m., *Parish* 4132 (C, G, MBG TYPE, NY, US); in arenis, Palm Springs, Colorado Desert, Apr. 28, 1922, *Spencer* (MBG).

Jepson's *L. Torreyi* var. *Wrightii* is apparently a misconception of Gray's variety, as the plants which Jepson had in mind, namely, the plants of the Colorado Desert, are certainly not those of Gray's var. *Wrightii* which does not occur in California. Therefore, a new name must be given this form. There is no doubt as to the relationships of this complex; it is much more closely related to *L. Andersonii* than to *L. Torreyi*, as is evidenced by the fact that the corolla is shaped like the former and has sparsely ciliate rather than lanate-ciliate corolla-lobes; however, *L. Torreyi* does occur in the Coachella Valley.

30. *L. Torreyi* Gray, Proc. Amer. Acad. 6: 47. 1862; Bot. Calif. 1: 543. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239. 1886; Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882; Coulter. Contr. U. S. Nat. Herb. (Bot. W. Tex.) 2: 302. 1892; Woot. & Standl. Contr. U. S. Nat. Herb. (Fl. N. Mex.) 19: 569. 1915; Rydb. Fl. Rocky Mts. 758. 1917; David. & Moxl. Fl. S. Calif. 321. 1923; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1288. 1924; Tidestrom, Contr. U. S. Nat. Herb. (Fl. Utah & Nev.) 25: 471. 1925; Jepson, Man. Fl. Pl. Calif. 890. 1925. Pl. 17, figs. 19–21.

*L. Torreyi* var. *filiforme* Jones, Proc. Amer. Acad. II, 5: 714. 1895.

*L. Berlandieri* γ *longiflorum* Terrac. Malpighia 4: 521. 1891.

A much-branched, spreading shrub 1–3 m. tall, with heavy spines 5–10 mm. long, or practically unarmed; branches densely leafy, glabrate; leaves usually spatulate, but sometimes elliptic or oblanceolate, 1–5 cm. long, 0.3–1.0 (1.5) cm. broad, usually somewhat acute at apex, attenuate at base to a short petiole 2–3 mm. long, midnerve visible; flowers 1 or 2 (3) in a fascicle, pedicels 5–20 mm. long; calyx cup-shaped to tubular, 2.5–4.5 mm. long, about 2 mm. in diameter, sparsely pubescent to glabrate, lobes 5,  $\frac{1}{4}$ – $\frac{1}{2}$  the length of the tube, triangular, margins somewhat ciliate; corolla-tube narrowly obconic, 8–15 mm. long, somewhat

constricted at top of ovary, and flared slightly at summit, 1.5-2 mm. in diameter at base, 3-4 mm. in diameter at top, greenish-lavender or whitish, usually glabrous without, but sometimes with few scattered hairs, the 5, less commonly 4, lobes rounded to oval or even lanceolate, 1-3 times as long as broad, and  $\frac{1}{6}$ - $\frac{1}{4}$  the length of the tube, spreading, their margins densely ciliate-lanate with branched hairs which are apparent as a tiny white fringe; stamens equalling or slightly shorter than the lobes, thus usually exserted but slightly, filaments adnate to about the middle of the corolla-tube, rather densely hairy for about the first 1.5 mm. of their free portion, adjacent corolla-tube also hairy, anthers 1-1.5 mm. long; style slightly longer than stamens, usually exserted 2-3 mm. beyond corolla-tube; berry ovoid, 6-10 mm. long,  $\frac{2}{3}$  as thick, bright red, 8-30-seeded; fruit very juicy, sweet and not unpalatable.

Type: Fort Yuma, California, March 3, 1855, *Thomas* (G). Gray cited six collections in his original description, but did not designate any type. The above collection is very representative for the species and has the added advantage of being represented in both the New York Botanical Garden and the Gray Herbarium.

Distribution: western Texas, New Mexico, southern and western Arizona, southwestern Utah, southeastern Nevada, the Colorado and southern Mohave Deserts of California, and the states of Sonora, Chihuahua and Hidalgo, Mexico.

Material seen:

UNITED STATES OF AMERICA

WITHOUT LOCALITY: *C. Wright* 1604, on this sheet Gray has written: "these numbers (1604 and 1608) much confused; I have these as 1609 only, and no *Lycium* as 1608 or 1604," (NY); *Mex. Bound. Surv.* 1029 (US); *Schott* 158, *Mex. Bound. Surv.* (F); *Fremont's Exp. Calif.* 1843-4 (NY).

TEXAS: El Paso, *C. Wright* 1609 (F, G, MBG), *L. puberulum* is also under this number; Rio Grande bottom, coll. of 1881, *Havard* 160 (G, PA); El Paso, Sept. 25, 1901, *Bailey* 726 (US); El Paso, banks of the Rio Grande, May 8-19, 1902, *Earle* 466 (NY); El Paso, Apr. 19, 1884, *Jones* 3790 (C, D, F, P, US); El Paso, coll. of 1881, *Lemmon* (C); El Paso, June 17, 1893, *Mearns* 1490 (S, US); vicinity of El Paso, coll. of 1911, *Stearns* 131 (US);

El Paso, coll. of 1881, *Vasey* (F, G, US); El Paso, Apr. 1881, *Vasey* (US); Fabens, El Paso Co., July 3, 1921, *Ferris & Duncan* 2443 (CA, NY, S); plains and low hills, El Paso, *Bigelow* (NY); Infie, near Laredo, Aug. 1899, *Mackenzie* 98 (MBG); Rio Grande near Ruidoso, Oct. 1883, *Havard* 89 (G, US); Croton Camp, Matada Ranch, Dickens Co., June 15, 1904, *Coville* 1869 (US); alluvions of the Rio Grande, *C. Wright* 301 (NY, US).

NEW MEXICO: on the upper Rio Grande, coll. of 1851-52, *C. Wright* 1608 (MBG, NY, US); New Mexico, *C. Wright* 1607 (G); La Luz Canyon, La Luz, May 24, 1902, *Rehn & Viereck* (PA); valley of Rio Grande, 15 mi. west of El Paso, Texas, Dona Ana Co., July 11, 1917, *Munz* 1270 (P); chaparral from El Paso to Copper Mines, Apr. 1851, *Thurber* 196 (G, NY); 9 miles south of Las Cruces, June 16, 1930, alt. 1100 m., *Goodman & Hitchcock* 1138 (MBG); Las Cruces, Dona Ana Co., July 20, 1889, *Munson & Hopkins* (US); irrigation ditch, 5 mi. from Las Cruces, June 30, 1918, *Ferris* 1130 (S); canal bank, Vado, Aug. 13, 1930, alt. 1150 m., *Fosberg* S3642 (MBG); Las Cruces, June 16, 1891, *Dewey* (US); bank of slough, 2 mi. N. of Fairacres, Dona Ana Co., July 27, 1930, alt. 1170 m., *Fosberg* S3361 (MBG); 2 miles north of Mesquite, Aug. 27, 1930, alt. 1160 m., *Fosberg* S3417 (MBG); Mesilla Valley, Dona Ana Co., May, 1894, alt. 1200 m., *Wooton* (NY, US); Mesilla, Mesilla Valley, May 3, 1899, *Wooton* (US); Mesilla Valley, May, 1903, *Wooton* (C, P, S); Mesilla Valley, May, 1905, *Wooton* (DL, US); Mesilla Valley, July, 1906, alt. 1200 m., *Wooton & Standley* (US); Mesilla Valley, July 21, 1907, alt. 1200 m., *Wooton & Standley* 3343 (S, US); Mesilla Valley, Apr. 29, 1906, *Standley* 15 (MBG); Agricultural College, Mesilla Valley, May, 1894, *Wooton* (US); Mesilla Valley, June 16, 1897, *Wooton* 13 (C, D, G, MBG, NY, S, US); Mesilla, June 16, 1897, alt. 1200 m., *Wooton* 13½ (C, D, MBG, NY, P, S, US); lake east of Dona Ana Mts., Sept. 6, 1908, *Wooton & Standley* (US); Organ Mts., Dona Ana Co., May 25, 1898, *Herrick* 235 (US); mesa west of Organ Mts., Dona Ana Co., Oct. 25, 1904, *Wooton* (US); 8 miles north of Deming, Luna Co., Sept. 3, 1908, alt. 1400 m., *Goldman* 1503 (US); 7 miles north of Las Palomas Hot Springs, Sierra Co., Oct. 28, 1909, *Goldman* 1799 (US); Rio Grande, 20 miles above Rincon, Sierra Co., Sept. 6, 1904, alt. 1400 m., *Met-*

*calfe* 1282 (CA, D, F, G, NY, P, US); irrigation ditch, San Antonio, Socorro Co., June 21, 1921, *Ferris & Duncan* 2319 (CA, MBG, NY, S); Socorro, Socorro Co., Aug. 20, 1909, *Goldman* 1645 (US).

ARIZONA: *Wheeler*, coll. of 1871 (G); southeastern Arizona, *Lemmon* (C); Colorado River Valley, March, 1876, *Palmer* (NY, PA); Williams' Fork of Colorado River, March 11, 1876, *Palmer* 424 (F, G, MBG, PA, US); Sacaton, Pinal Co., March 15, 1930, *Peebles* 8446 (US); Sacaton, March 15, 1926, *Peebles & Harrison* 1165 (US); Agua Caliente, March 19, 1914, *Carlson* (CA); Yuma, coll. of 1881, *Vasey* (G, US); bottom-lands near the mouth of the Gila, Yuma Co., coll. of 1855, *Schott* (F); near Dome, Yuma Co., March 10, 1928, *Peebles & Harrison* 5045, suggestive of hybrid between *L. Torreyi* and *L. Andersonii* (SAC); Beaverdam, Apr. 5, 1894, alt. 600 m., *Jones* 5015, type collection *L. Torreyi* var. *filiforme* (C, MBG, NY, P TYPE, US); near The Needles, Mohave Co., March 14, 1905, *MacDougal* 10 (NY); Fort Mojave, sandy summit of desert, coll. of 1860-61, *Cooper* (G); Fort Mojave, Feb. 25, 1861, *Cooper* (US); Hardyville, Mohave Co., May 8, 1876, *Palmer* 425 (C, F, G, MBG, NY, PA, US); near Petrified Springs, Littlefield, Mohave Co., Apr. 29, 1919, *Tidestrom* 9237 (NY).

UTAH: southern Utah, coll. of 1874, *Parry* 202 (D, F, G, MBG, PA); in fields along Santa Clara Creek, St. George, May 3, 1919, *Tidestrom* 9282a (PA); St. George, Washington Co., May 11, 1891, alt. 875 m., *Bailey* 1952 (US); dry roadside, from Leeds to St. George, June 1, 1929, alt. 1100 m., *Cottam* 4015 (P, GAR); St. George, March 30, 1926, alt. 1000 m., *Field Biology Class of Dixie College* S. 32 (GAR), hybrid between *Torreyi* and *Andersonii* ?; St. George, Apr. 2, 1880, *Jones* 1624, hybrid between *Torreyi* and *Andersonii* ? (F), but the remainder of the plants under this number are *L. Andersonii*; St. George, coll. of 1877, *Palmer* 365 (G in part, US, NY); St. George, coll. of 1877, *Palmer* 366 (G, NY).

NEVADA: Karshow, Apr. 26, 1902, *Goodding* 633 (D, MBG); St. Joe, Apr. 9, 1894, alt. 1200 m., *Jones* 5030h (P, US); Moapa, Clark Co., May 5, 1909, *Kennedy* 1816 (F, PA, US); Muddy River, near Moapa, July 5, 1924, *F. O. Ballou* (S); Muddy River,

Moapa, March 20, 1919, *Tidestrom* 8618 (PA); near St. Thomas, Clark Co., May 6, 1891, *Bailey* 1928 (US); Las Vegas, June, 1915, *K. Brandegee* (C); Vegas Wash, near Colorado River, Apr. 15, 1919, alt. 450 m., *Tidestrom* 8981 (CA, PA); on mesa, Las Vegas, May 28, 1919, alt. 610 m., *Tidestrom* 9679 (NY); flood plain at Muddy River, St. Thomas, March 21, 1919, *Tidestrom* 8637 (PA); El Dorado Canyon, Lincoln Co., coll. of 1880, *T. W. Davis* (MBG).

CALIFORNIA: Fort Yuma, Colorado Desert, March 3, 1855, *Thomas* (G, NY); Yuma, near bridge, June 29, 1925, *McMinn* 1462 (S); Yuma, Feb. 20, 1881, *Parish & Parish* 781 (G, S); bottomland of Colorado River, Ft. Yuma, Feb. 26, 1913, *S. B. Parish* 8491 (G, S); California and Sonora near Fort Yuma, March 6, 1855, *Schott* (NY); Camp Cady, May, 1882, *Parish & Parish* 781a (S); Mason's, Colorado Desert, Apr. 9, 1896, *T. S. Brandegee* (C), possibly a hybrid between *Torreyi* and *Fremontii*; Needles, on benches of Colorado River, May 11, 1913, alt. 150 m., *Jepson* 5484 (G); Colorado River bottoms, near Blythe, Riverside Co., June 19, 1918, *Ferris* 1013 (CA, S); Palm Canyon, Apr. 4, 1917, alt. 300 m., *Johnston* 1035 (C, P, S, US); in rocky places, Snow Creek, near Palm Springs, Riverside Co., Apr. 10, 1922, alt. 150 m., *Spencer* 2095 (G, PA); Carizzo Creek, Colorado Desert, March 27, 1901, *T. S. Brandegee* (C); Coyote Canyon, west borders of Colorado Desert, Apr. 1902, alt. 150 m., *Hall* 2800 (C); Hawley's Station, Mohave Desert, May 1882, *Parish* 781 (MBG, US); near Daggett, San Bernardino Co., Apr. 27, 1929, *Hoffmann* (SBM); bank of Mohave River, 11 mi. s. of Barstow, Apr. 14, 1932, *Munz & Hitchcock* 12256 (P).

#### MEXICO

SONORA: Libertad, March 20, 1926, *Long* 32 (US).

CHIHUAHUA: Juarez, June 26, 1891, *Evans* 3397 (MBG); valley of Rio Grande, Paso del Norte, Sept. 14, 1886, *Pringle* 786 (C, D, F, G, MBG, NY, PA, ST, US, V); vicinity of Paso del Norte, June 1, 1883, *Oyster* (CA).

HIDALGO: near Ixiquilpan, coll. of 1905, *Rose, Painter & Rose* 8949 (US).

31. *L. Parishii* Gray, Proc. Amer. Acad. 20: 305. 1885, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 437. 1886; Abrams, Fl. Los Angeles

& Vic. 324. 1917; David. & Moxl. Fl. S. Calif. 321. 1923; Jepson, Man. Fl. Pl. Calif. 891. 1925, in part only.

Pl. 18, figs. 13-15.

*L. Pringlei* Gray, Proc. Amer. Acad. 20: 305. 1885, and Syn. Fl. N. Amer. ed. 2, 2: 437. 1886.

*L. Richii* Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924, in large part, as to description and synonymy.

A rather rigid, much-branched, spiny shrub 1-3 m. tall, pubescent, somewhat glandular, armed with short, sharp spines 3-5 mm. long; branches spreading, the old epidermis silvery to dark brown; leaves spatulate, sometimes somewhat elliptic, 1-4 in a fascicle, 3-10 mm. long, 1-4 mm. broad (much larger on very young and vigorous branches), rounded to obtuse at apex, contracted to a short petiole, very pubescent, sometimes cinereous; flowers few, borne singly, pedicels 5-10 mm. long; calyx densely pubescent, campanulate, 2.5-6 mm. or more long, lobes 5, erect, oblong-oval, apex rounded to acute,  $\frac{1}{2}$  as long to considerably longer than tube; corolla bright purple, throat usually darker within, tube brownish, narrowly campanulate to narrowly obconic, rather conspicuously contracted above the ovary, 6-10 mm. long, 2-3 mm. in diameter at the summit, lobes 5, somewhat rotate, oval,  $\frac{1}{4}$ - $\frac{1}{3}$  as long as tube, their margins rather densely ciliolate; stamens about equaling corolla-lobes, exserted, due to the spreading of the latter, filaments adnate about half the length of the corolla-tube, densely pubescent on the lower fourth of the free portion, adjacent corolla-tube less hairy, anthers about 1.25 mm. long; style about equaling longer stamens; berry red, ovoid, 4-6 mm. long, 3-5 mm. thick, 7-12-seeded.

Type: mesa in the San Bernardino Valley, San Bernardino Co., California, April 1, 1881, S. B. & W. F. Parish 795 (G). There is a note on the sheet of the type collection in the University of California Herbarium which reads: "There was but a single shrub on the mesa north of San Bernardino near what is now Arrowhead Station on the branch of the Santa Fe R. R. to Highland. It was long since destroyed. The shrubs near Elsinore reported to be of this species are not so, probably *L. californicum*, although I have not seen flowering specimens." This note was written by Mr. S. B. Parish, Aug. 1, 1918.

Distribution: known only from two stations in California, the type locality and Vallecitos in the Colorado Desert; however, it is apparently rather common in southern Arizona, probably extending across the extreme southern portion of the state into northern Sonora, Mexico.

Material seen:

UNITED STATES OF AMERICA

CALIFORNIA: mesa, San Bernardino, Apr. 1, 1881, *S. B. & W. F. Parish* 795 (F, G TYPE, MBG, PA, US); mesas, San Bernardino, Apr. 1885, *S. B. Parish* 795 (C, S, US); mesa north of San Bernardino, May, 1885, *S. B. Parish* (NY); Vallecitos, Colorado Desert, Apr. 10, 1896, *T. S. Brandegee* (C in part, F); Colorado Desert, Apr. 1905, *T. S. Brandegee* (C); in small canyon near Mt. Palm springs, San Diego Co., Apr. 4, 1932, *Munz & Hitchcock* 12098 (P), shade plants like type of *L. Pringlei*, plants in sun with much shorter calyx-lobes.

ARIZONA: Bill Williams Mt., coll. of 1870, *Palmer* (US); near Mohawk, Yuma Co., March 8, 1928, *Peebles & Harrison* 5007 (US); near Mohawk, Yuma Co., Apr. 5, 1931, *Peebles* 7709 (P, SAC); Mohawk Pass, Apr. 12, 1930, *Peebles* 6795 (US); dry rocky hill, Mohawk, Oct. 8, 1927, *Peebles, Harrison & Kearney* 4920 (US); Vekol Valley, March 2, 1930, *Fulton* 6436 (US); *Peebles & Loomis* 7497 (P, SAC); near Aztec, Yuma Co., March 28, 1930, *Kearney & Harrison* 6554 (US); between Casa Grande and Gila Bend, March 28, 1930, *Harrison & Kearney* 6538 (MBG, P, US); Coyote to Santa Rosa, March 13–Apr. 23, 1903, *Griffiths* 3995 (US); south of Wellton, March 28, 1930, *Harrison & Kearney* 6560 (P, US).

MEXICO

SONORA: washes of streams, March 28, 1884, *Pringle*, type collection *L. Pringlei* (CA, D, F, G TYPE, NY, PA, US); Sonora, '84 (NY).

*Lycium Pringlei*, described from a collection made by Pringle in northwestern Sonora near the United States boundary, differs but slightly from the type of *L. Parishii*. The calyx-lobes are longer, but the flowers of the two are identical. On the sheet of the type collection of *L. Pringlei* at Field Museum, one of the two branches is almost the counterpart of the type of *L. Parishii*.

For some unknown reason *L. Parishii* has been collected but relatively a few times, a fact which would lead one to suppose that it is rather a rare plant. However, the notes made by Mr. Peebles and his associates at the United States Field Station at Sacaton, Arizona, indicate that it is fairly common in that region, ranging across the state near the Mexican boundary. It is evident from Parish's note that he thought the species was eradicated when the bush from which the type had been collected was destroyed (the Elsinore plants were *L. Andersonii*).

The long calyx-lobes furnish the most striking characteristic for this species; however, at times (usually on old branches) the calyx-lobes are shortened, rarely being scarcely more than one millimeter long. In all instances, they are equally lobed rather than irregularly cleft, as is the case in *L. Andersonii*; also, the corolla-tube tends to be more conspicuously expanded at the summit. The dense pubescence is another character which helps to separate it from *L. Andersonii*. Harrison and Kearney's number 6538 is unusual in that some of the calyx-lobes are ovate-lanceolate and over five millimeters in length, a condition which is more suggestive of the type of *L. Pringlei* than that of *L. Parishii*.

32. *L. humile* Philippi, Fl. Atac. 43. 1860; Reiche, Anal. Univ. Chil. 123: 397. 1908, and Fl. Chil. 5: 317. 1910.

Pl. 17, figs. 7-9.

*L. chilense*  $\alpha$  *normale* var. *deserticum* Terrac. Malpighia 4: 528. 1891, in part.

A low, prostrate or ascending, unarmed, glabrous perennial 6-20 cm. tall, spreading by underground stems, often forming dense matted growths; branches much shortened, old ones gnarled and twisted, rather densely covered with leaves, straw-colored, glabrous; leaves obovate-spatulate to linear-ob lanceolate, thick and fleshy, 5-15 mm. long, 2-6 mm. broad, rounded or obtuse, gradually attenuate to a very short petiole, borne singly, or less commonly, in 2's or 3's; flowers borne singly at the nodes on pedicels 0.5-1.5 mm. long; calyx tubular, unusually large, tubular portion about 4 mm. long, 2 mm. in diameter, glabrous, lobes 5, triangular, about 1 mm. long, their margins tomentulose-ciliate;

corolla infundibuliform, tube 12–14 mm. long, about 3 mm. in diameter at the summit, little more than 1 mm. in diameter at the top of the ovary, whitish, glabrous, lobes 5, oval, about 2 mm. long, spreading, their margins not ciliate; stamens 5, partially included, filaments unequal, long ones nearly 1 mm. longer than tube of the corolla, 2 mm. or more longer than shortest one, adnate to the corolla-tube for about half its length, very sparingly pubescent at the base of the free portion, corolla somewhat pubescent for 2–3 mm. below free portion of filaments, anthers 1 mm. long; style exceeding stamens, usually exserted 2–3 mm.; berry "black, subglobose."

Type: no type specified, but "prope Cachiyuyal, 24° 22' lat. m. 4000 p. s. m." *Philippi*, is the first collection cited (Museo Nacional, Santiago, Chile).

Distribution: dry interior valleys of Chile from the Province of Atacama to the Province of Antofagasta.

Material seen:

CHILE: Salar Punta Negra, Prov. Antofagasta, Dept. Taltal, Feb. 1926, alt. 3500 m., *Werdermann* 1002 (C, CA, F, G, MBG, ST); San Andres, lat. 26° 59' S, long. 69° 39' W, Prov. Atacama, Dept. Copiapo, Nov. 2, 1925, alt. 2200 m., *Johnston* 4829 (G); Desertum Atacama, *Philippi* 758 (MBG, photograph of specimen at Berlin); Agua del Profita, in des. Atacama, *Philippi* (V).

*Lycium humile* resembles *L. repens* in habit and the nature of the calyx, but has a longer corolla and pubescent filament bases. It differs from *L. Fremontii* in general habit and lack of pubescence on the corolla, calyx, and leaves.

33. *L. repens* Speg. Rev. Fac. Agr. y Vet. la Plata (Pl. Patag. Austr.) 3: 554. 1897, and Anal. Soc. Cient. Arg. (Nov. Add. Fl. Patag.) 53: 169. 1902. Pl. 17, figs. 4–6.

A dwarfed, unarmed, prostrate or tufted pubescent plant 5–15 (25?) cm. tall, spreading by creeping surface or underground stems; branches straw-colored to tan, rather tardily glabrous, densely pubescent on youngest parts, dark brown, thick, and corky on underground portions, 2–8 cm. long; leaves 1–3 in a fascicle, spatulate or obovate, 4–20 mm. long, 2–5 mm. broad, rounded or obtuse at the apex, attenuate to a short petiole-like

base, thick and apparently fleshy, rather densely covered with somewhat hispidulous, simple or forked hairs, often giving the plant a grayish appearance; pedicels 2-5 mm. long, pubescence same as on leaves; flowers borne singly, calyx tubular, 2.5-4 mm. long, 2.5-3 mm. in diameter, the 5 lobes about  $\frac{1}{2}$  the length of the tube, pubescence as on leaves; corolla "light blue," nearly tubular, slightly expanded at summit, the tube 4-6 mm. long, about 2 mm. in diameter, glabrous except for the rather conspicuous ciliate margins of the 5 lobes, these oval, about  $\frac{1}{4}$  length of tube, somewhat spreading; stamens 5, included, equal in length to corolla-tube or 1-2 mm. shorter, filaments adnate nearly half the length of the tube, or slightly less, equal or subequal, filaments and corolla both glabrous, anthers about 1 mm. long; style equalling or slightly exceeding stamens, usually about equalling corolla-tube; ovary with conspicuous disc at base; berry "globose-obovate," 8 mm. long and 6 mm. in diameter, "glabrate, shining, red, black with age."

Type: "in lapidosis ad marginem laculorum salsorum prope Santa Cruz, Argentina," collected in 1882, *C. Spegazzini*.

Distribution: Terr. of Santa Cruz, southern Argentina, from the coast inland to Lake Buenos Aires.

Material seen:

ARGENTINA: Patagonia andina, Terr. Santa Cruz, Rio Antiguos, am. Lag. Buenos Aires, Dec. 15, 1908, *Skottsberg* 675 (ST); Puerto San Julian, Terr. Santa Cruz, coll. of 1925-27, *Blake* 38 (KEW); Puerto San Julian, Terr. Santa Cruz, Patagonia, coll. of 1925-27, *Blake* 39 (KEW); prope Santa Cruz, amporium in ripa argillosa lacusente, Dec. 23, 1904, *Dusén* 5467 (ST); Terr. Santa Cruz, Golfo San Jorge, 1899-1900, *Ameghino* 165 (BA); Terr. Santa Cruz, Nov. 25, 1929, alt. 200 m., *Donat* 170 (MBG); Chubut, Valle del Rio Chico, Feb. 1930, *Ferruglio* (MBG).

As Spegazzini pointed out in his original description, this plant remotely suggests *L. capillare* Miers because of the glabrous condition of the filaments and corolla-tube, but it is very unlike that species otherwise. It appears to be rather closely related to *L. humile* of South America, and to *L. Fremontii* of North America, resembling the latter in flower size and shape and in calyx characters. Its decumbent habit and forked hairs set it off well from that species, however.

34. *L. Fremontii* Gray, Proc. Amer. Acad. 6: 46. 1862; Bot. Calif. 1: 543. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239, 437. 1886; Jepson, Man. Fl. Pl. Calif. 891. 1925. Pl. 17, figs. 10-15.

*L. gracilipes* Gray, Proc. Amer. Acad. 12: 81. 1877, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239. 1886; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924.

*L. Fremontii* Gray var. *gracilipes* Gray, Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 437. 1886.

*L. pallidum*  $\beta$  *Fremontii* Terrac. Malpighia 4: 519. 1891.

*L. pallidum*  $\beta$  *Fremontii* var. *gracilipes* (Gray) Terrac. l. c.

A freely branching, stout, pubescent, somewhat glandular shrub 1-2 (3) m. tall; branches slightly curving, stout, unarmed, or with few slender, sharp spines 10-15 mm. long, grayish-yellow, glabrous to slightly pubescent, striate; leaves 3-5 in a fascicle, typically spatulate, 10-25 mm. long, 3-6 mm. broad, puberulent to densely pubescent, rounded, or less commonly acute or obtuse; pedicels 4-15 (25) mm. long, densely pubescent; calyx tubular, 4-8 mm. long (3 mm. in small flowers), 2-2.5 mm. in diameter, usually 5-lobed, the lobes triangular, about 1 mm. long; corolla tubular to funnel-form, deep violet or lavender to white with purple veins, 8-15 (18) mm. long, about 1.5-2 mm. in diameter at base, 2-3 mm. at summit, narrower in very small flowers, the 5 lobes  $\frac{1}{4}$ - $\frac{2}{3}$  the length of the tube, flaring, margins simply entire or sparsely and finely ciliate; stamens unequal, usually much shorter than corolla-lobes, rarely equaling the latter; anthers about 0.8 mm. long, or slightly longer; filaments adnate about  $\frac{2}{3}$  the length of the corolla-tube, glabrous or with few scattered hairs at base of the free portion and above, adjacent corolla-tube glabrous or very sparingly pubescent; style about equaling or slightly exceeding the corolla-tube, sometimes much shorter than the stamens; stigma nearly 1 mm. broad; berry oblong-ovoid, 4-8 mm. thick and slightly longer, 40-60-seeded, red.

Type: interior of California or country east of it, coll. of 1849, *Fremont* (NY)—nearly identical with a plant collected in Santa Cruz Valley, Tucson, March 5, 1884, by C. G. Pringle.

Distribution: southern Arizona and the Imperial Valley of California, the islands and mainland of Baja California, and in northern Sonora, Mexico.

## Material seen:

## UNITED STATES OF AMERICA

ARIZONA: San Tan Mts., Pinal Co., Feb. 15, 1926, *Peebles* 719 (US); San Tan, March 3, 1926, *Harrison* 955 (US); Fish Creek, Apache Trail, Oct. 29, 1928, *Eastwood* 15790 (CA); Camp Grant, Yuma Co., March 10, 1867, *Palmer* 200 (G, MBG); near Dudleyville, March 13–Apr. 23, 1903, *Griffiths* 3688 (US); Sacaton, Pinal Co., March 19, 1919, *Eastwood* 8017, 8027 (CA), Feb. 24, 1930, *Peebles* 6412 (US); on alkali land, Sacaton, March 15, 1930, *Peebles* 6447, 6448, 6449 (MBG, P, SAC); Sacaton, Feb. 27, 1930, *Peebles* 6429 (MBG, P, SAC); Sacaton, March 15, 1930, *Peebles* 6452 (P, US), March 15, 1930, *Peebles* 6450, 6451, 6453 (US), Apr. 29, 1927, *Peebles* & *Harrison* 3970 (US), Feb. 3, 1931, *Peebles* 7475 (MBG, P, SAC), Oct. 2, 1925, *Peebles*, *Harrison* & *Kearney* 227 (US), Feb. 3, 1931, *Peebles* 7478 (SAC); Sacaton Agency, Sacaton, March 22, 1902, *Thornber* (US); near Eloy, Pinal Co., March 16, 1926, *Peebles* & *Harrison* 1166 (US); Santa Rosa to Casa Grande, Pinal Co., March 13–Apr. 23, 1903, *Griffiths* 4042 (MBG, US); near Casa Grande, March 20, 1930, *Peebles* & *Harrison* 6457 (US); near Casa Grande, March 20, 1930, *Peebles* & *Harrison* 6459 (US); Roosevelt Dam, Gila Co., May 17, 1919, *Eastwood* 8673 (CA); on road to Packard from Roosevelt, May 10, 1929, *Eastwood* 17063 (CA); near Oracle, on road from Roosevelt to Tucson, May 25, 1929, *McKelvey* 1128 (ST); Roosevelt Dam, May 20, 1917, *Mrs. J. F. Wilson* (C); on road from Oracle to Globe, Gila Co., May 25, 1929, *Eastwood* 17475 (CA); between Roosevelt Dam and Packard, March 11, 1929, *McKelvey* 875 (CA); Maricopa, Pinal Co., Apr. 22, 1917, *Eastwood* 6321 (CA), May, 1885, *A. Gray* (G), Dec. 1881, *Parry* (F, G, MBG); Catalina Mts., Pinal Co., March 14, 1892, *Toumey* 390 (S, US); Agua Caliente, March 19, 1914, *Carlson* (CA); Phoenix, Maricopa Co., Apr. 18, 1917, *Eastwood* 6139 (CA), Apr. 18, 1917, *Eastwood* (CA), March 14, 1897, *Kunze* (NY); moderately alkaline soil near Phoenix, Aug. 30, 1901, *Kearney* 122 (MBG, US); Tempe, Apr. 20, 1892, *Ganong* & *Blaschka* (G); Tempe, on way to Florence, Dec. 1900, *Griffiths* 2224 (NY); Tempe, Apr. 6, 1894, *Toumey* (C, NY, US); river bank of the Gila near Dome, Yuma Co., Jan. 1916, *Monnet* 1181 (CA, US); Parker Ferry, Yuma Co., March 22, 1931, *Har-*

*rison, Kearney & Fulton* 7528 (P, SAC); Tucson Mts., Jan. 2, 1920, *Bartram* 236 (US); Tumamoc Hill, Tucson, Pima Co., Apr. 2, 1909, *S. B. Parish* (S); Tucson, coll. of 1911, *Beard* (MBG); Sabino Canyon, near Tucson, March 14, 1930, *Eastwood* 17746 (CA); base of Signal Peak, Tucson, Dec. 24, 1919, *Bartram* 260 (PA); from same locality, Jan. 5, 1920, *Bartram* 234 (PA); Tucson, Nov. 1900, *Griffiths* 2099 (NY); Santa Cruz bottoms near Tucson, March 13–Apr. 23, 1903, *Griffiths* 4055 (MBG); Tucson, March 15, 1907, *Lloyd* (F), Apr. 11, 1884, *W. F. Parish* (C, NY, US), Apr. 1884, *S. B. & W. F. Parish* (C), Apr. 11, *W. F. Parish* 180 (F, G, S); Pima Canyon, near Tucson, *S. B. Parish* 8512 (S); Tucson, Jan. 23, 1881, *Parry* (MBG); Tucson Mts., Jan. 2, 1920, *Bartram* 236 (PA); Santa Cruz Valley, Tucson, March 5, 1884, *Pringle* (CA, D, F, G, NY, PA, US), Dec. 7, 1881, *Pringle* (CA, D, F, MBG, NY, PA, US); Tucson, Nov. 11, 1893, *Toumey* 28 (US), Apr. 8, 1892, *Toumey* 389 (US), May 1, 1894, *Toumey* 191 (NY), Nov. 11, 1893, *Toumey* (US), Nov. 11, 1894, *Toumey* (C, DL, NY), March, 1881, *Vasey* (US), coll. of 1881, *Vasey* (F, G, MBG, US); Williams' Fork of Colorado R., March 11, 1876, *Palmer* 423, TYPE collection of *L. Fremontii* var. *gracilipes* (G TYPE, F, MBG, NY, US); Williams' Fork of Colorado River, coll. of 1876, *Palmer* 422 (G, NY, PA, US); roadside, Western Canal, Salt River Valley, Maricopa Co., March 14, 1930, *Peebles* 6444 (P, SAC); near Hyder, Yuma Co., Feb. 25, 1930, *Peebles* 6428 (US); Colorado River bottoms, Yuma, Dec. 1, 1898, *W. F. Price* (S); Fort Mohave, Mohave Co., March 23, 1931, *Harrison, Kearney & Fulton* 7558 (P, SAC); without definite locality, *Fremont Exped. Calif.*, 1849 (NY TYPE); Arizona, *Lemmon* (C); southern Arizona, coll. of 1873, *P. F. Mohr* (US).

CALIFORNIA: Split Mt., Colorado Desert, Apr. 1905, *T. S. Brandegee* (C); Borrego Springs, Colorado Desert, San Diego Co., Apr. 22, 1895, *T. S. Brandegee* (C); Boundary Monument 222, Colorado Desert, San Diego Co., between Calexico and Signal Mts., Apr. 2, 1903, *Abrams* 3149 (F, G, MBG, NY, P, S); Signal Mt. March 30, 1901, *T. S. Brandegee* (C); Painted Canyon, Colorado Desert, March 24, 1928, *J. T. Howell* 3530 (CA, S); San Felipe Canyon, Colorado Desert, San Diego Co., Apr. 13, 1913, *Eastwood* 2785 (CA); wash in Santa Rosa Mts., Colorado Mts.,

alt. 150 m., Jan. 29, 1921, *Childs* (C); San Bernardino, possibility wrong locality?, *Lemmon* (C); San Diego, Dec. 1908, *Dudley* (S); west end of Santa Rosa Is., July 9, 1930, *Hoffmann* (CA, P).

#### MEXICO

BAJA CALIFORNIA: gravel mesas, Cucopa Mts., Apr. 5, 1905, *MacDougal 140* (NY); the three following collections have pubescent corolla-tubes: Magdalena Is., Jan. 13, 1889, *T. S. Brandegee* (C); Santa Margarita Island, March 2, 1889, *T. S. Brandegee* (C), March, 1889, *T. S. Brandegee* (C).

SONORA: vicinity of Hermosillo, March 6, 1910, *Rose, Standley & Russell 12443* (NY, but not that specimen in US); Sonora, *Schott* (F); dry plain, vicinity of Empalme, March 11, 1910, *Rose, Standley & Russell 12621* (US); Sonoya River, at Santo Domingo, Jan. 14, 1894, *Mearns 2717* (US); Sonoya, Jan. 19, 1894, *Mearns 2733* (NY, S, US).

*Lycium Fremontii* is rather remarkable among the North American species because of the unusual length of the calyx-tube, *L. exsertum* being the only other species from this hemisphere which approaches it in this respect. *Lycium repens* and *L. humile* are the South American species most closely related to it. The flowers are strikingly dimorphic, one type having a tubular corolla, which is but one and one-half the length of the calyx, the other extreme having a funnelform corolla fifteen millimeters in length, the tube being much flared at the summit, and the anthers frequently but partially developed. This variation may be due at least in part to the age of the plant—flowers from old branches usually being reduced in size, whereas the leaves and flowers of young, vigorously growing branches are sometimes twice the size of the former.

A series of specimens collected by Mr. Peebles is especially interesting in this connection: His number 6428, collected near Hyder, Arizona, is a very young shoot having extremely large flowers, and number 6452, from Sacaton, is also a young shoot which has flowers that would almost seem to belong to a different species when first seen. Peebles and Harrison no. 6457, from near Casa Grande, has flowers on the lower portion which resemble those of the above plant—on the upper portion, however, they are smaller, the corolla is narrower and presents an entirely

different aspect, being much like the flowers on the specimen of Peebles and Harrison no. 6459, from the same locality. The flowers on this plant represent the other extreme, in that the branches are old, the leaves are small, and the corollas are only about 8 mm. long. The stigma is exserted because of the fact that the corolla-lobes are revolute. The tubular calyx and included stamens (which are but very sparsely pubescent at base) are typical.

The corolla-size, the length of the lobes, leaf-size, pubescence, and stigma length all vary, so that the specimens cited include a wide range of variation. Because of the fact that *L. Fremontii* is such a protean species, it is deemed best to adopt a rather conservative viewpoint in delimiting subordinate groups, but even so, there is one well-marked group which must be given varietal rank.

34a. *L. Fremontii* var. *congestum* C. L. Hitchcock, nom. nov.

*L. umbellatum* Rose, Contr. U. S. Nat. Herb. 1: 74. 1890; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924; I. M. Johnst. Proc. Calif. Acad. Sci. IV, 12: 1154. 1924.

Branches pale green, exceedingly pubescent; leaves oblong-ovoblate, less commonly spatulate, blade 1.5–3 cm. long, nearly  $\frac{1}{2}$  as broad, petiole nearly  $\frac{1}{2}$  as long as blade, densely pubescent, somewhat viscid; lobes of corolla densely ciliate; filaments rather densely pubescent just above point of adnation; berry nearly 1 cm. long.

Type: La Paz, Lower California, between January 20 and February 5, 1890, Palmer 13 (US).

Distribution: Baja California and Sonora, Mexico.

Material seen:

MEXICO

WITHOUT LOCALITY: T. S. Brandegee (C), distributed as "L. umbellatum Rose? ex char."

BAJA CALIFORNIA: La Paz, Feb. 3, 1906, Nelson & Goldman 7488 (MBG, US); La Paz, Jan. 20–Feb. 5, 1890, Palmer 13 (US TYPE, G, NY); La Paz, coll. of 1927, Jones 24159 (C, MBG, P); La Paz, Apr. 11, 1921, Johnston 3040 (CA, G, US); road to Cerro Colorado from Agua Colorado, alt. 30–150 m., Dec. 15, 1905, Nelson & Goldman 7322 (US).

SONORA: vicinity of Hermosillo, March 6, 1910, *Rose, Standley & Russell 19441* (NY, US).

There seems to be but little justification for maintaining this variety as specifically distinct from *L. Fremontii*, the chief differences being the larger size and more dense pubescence of all parts.

Rose's species was antedated by *L. umbellatum* of Ruiz and Pavon,<sup>17</sup> which is a different plant.

35. *L. exsertum* Gray, Proc. Amer. Acad. 20: 305. 1885; Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 437. 1886; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1286. 1924. Pl. 17, figs. 16-18, 22-27.

*L. Fremontii* var. *Bigelovii* Gray, Proc. Amer. Acad. 6: 47. 1862; Bot. Calif. 1: 543. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 239. 1886.

*L. retusum* Rob. & Fern. Proc. Amer. Acad. 30: 120. 1894; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924.

*L. pallidum*  $\beta$  *Fremontii* var. *Bigelovii* (Gray) Terrac. Malpighia 4: 520. 1891.

*L. pallidum*  $\beta$  *Fremontii* var. *gracilipes* subvar. *exsertum* (Gray) Terrac. l. c.

A rather sparingly branched, few-spined, densely pubescent shrub 1-3.5 m. tall; branches rigid, densely pubescent, apparently very glandular when young, gray to reddish-brown when mature, spines slender, sharp, 3-7 (10) mm. long; leaf-blades spatulate to obovate-spatulate, 0.5-2 (4) cm. long, 3-5 (10) mm. broad, rounded or obtuse, less commonly acute, attenuate to a petiole 3-5 mm. long, densely and finely pubescent, somewhat glandular-viscid, midnerve evident; flowers borne singly, or more commonly in 2's or 3's, pedicels 3-5 mm. long, densely viscid-pubescent, usually recurved and flowers pendent; calyx tubular-campanulate, 2.5-6 mm. long, densely pubescent, lobes 5, acutely deltoid,  $\frac{1}{3}$ - $\frac{1}{2}$  the length of the tube, equal, or irregularly lobed and more or less 2-lipped, in which case some of the lobes may be as long as the tube; corolla-tube whitish to brownish, obconic, narrowed slightly above ovary, (6) 10-14 mm. long, about 4 times as wide at top as at base, glabrous without, lobes 5, pale lavender, oval,

<sup>17</sup> Ruiz and Pavon, Fl. Peruv. 2: 45. 1799.

about  $\frac{1}{6}$  length of tube, rotate or deflexed, retuse or rounded at apex, edges usually revolute, glabrous or very sparsely ciliolate; stamens subequal, exserted 2-3 mm. or more from corolla-tube, except when non-functional, filaments adnate to corolla-tube for about  $\frac{1}{6}$  its length, lower  $\frac{2}{3}$  of their free portion thickly hairy, corolla-tube less dense-hairy from top of ovary to a point about  $\frac{3}{4}$  way from base, anthers 1.5-2 mm. long; style usually slightly shorter than stamens, and only slightly exserted but sometimes exserted 2-4 mm., frequently sparingly hairy near stigma; ovary ovoid, 6-7 mm. long, 20-30-seeded.

Type: near Altar, northwestern Sonora, Mexico, March 22, 1884, Pringle (G).

Distribution: southern Arizona, and the northern portions of the states of Baja California, Sonora, and Sinaloa, Mexico.

Material seen:

#### UNITED STATES OF AMERICA

ARIZONA: Roosevelt, March 31, 1928, Peebles, Harrison & Kearney 5217 (US); on road between Sonoita and Vail, March 18, 1920, Eastwood 17795 (CA); near Magma, Pinal Co., Feb. 28, 1930, Peebles & Loomis 6430 (MBG, P, US); Sabino Canyon, March 20, 1897, Zuck (US); Sierra Estrella, Oct. 17, 1926, Peebles, Harrison & Kearney 3288 (US); Sacaton, Feb. 3, 1931, Peebles 7476 (MBG, P, SAC), Feb. 3, 1931, Peebles 7467 (P, SAC); San Tan Mts., Feb. 1, 1931, Peebles & Loomis 7456, 7457, 7458 (MBG, P, SAC); Baboquivari Canyon, Pima Co., Feb. 10, 1931, Peebles 7486 (MBG, P, SAC); Fresnal, Papago Indian Reservation, Pima Co., Feb. 10, 1931, Peebles 7487 (P, SAC); Sacaton Mts., Pinal Co., Jan. 11, 1931, Peebles & Loomis 7451 (MBG, P); San Tan Mts., Feb. 24, 1930, Peebles & Miller 6417 (P, US); base of cliffs, Jan. 27, 1929, Peebles 9841 (US); Tucson, March 3, 1894, Toumey (C, DL, NY); March 20, 1897, Zuck (US); on road to Rincon Mts., March 19, 1930, Eastwood 17826 (CA); on road to Rincon Mts., from Tucson, March 20, 1930, Eastwood 17863 (CA).

#### MEXICO

BAJA CALIFORNIA: Calmilli, *Purpus* 155 (C, NY, P); San Gregorio, Feb. 2, 1889, T. S. Brandegee (C); Cedros Is., Apr. 1, 1897, T. S. Brandegee (C), Apr. 4, 1897, T. S. Brandegee (C), with some doubt.

SONORA: March 22, 1884, *Pringle* (D, F, G TYPE, NY, PA, US).

SINALOA: vicinity of Culiacan, Oct. 10, 1904, *T. S. Brandegee* (G).

In discussing this species in the 'Synoptical Flora,' Gray said: "Very much like the last preceding" (*L. Fremontii*). On one of the sheets in the United States National Herbarium there is a notation by Mr. T. H. Kearney regarding the relationship of the two: "I am not sure, however, that *exsertum* is specifically distinct from *Fremontii* . . . if these forms of *Lycium* are dimorphic as to length of stamens and pistil, the character on which *L. exsertum* was mainly based loses its importance." The stamens in *L. Fremontii* do vary in length; in some instances they may even be exserted slightly, but the extreme length of those in *L. exsertum* far surpasses that of any specimen of *L. Fremontii*, and it appears clear that the two are very definite species. Besides the difference in stamen length there are several characters that are of value in separating the two. The calyx-tube of *L. exsertum* is much shorter in proportion to its lobes, and is more campanulate than tubular. The margins of the corolla-lobes in *L. exsertum* are practically without hairs, but are ciliate in *L. Fremontii*. The corolla-tube is more flaring in *L. exsertum*, and the general aspect of the two plants is usually quite dissimilar. Another character which is distinctive between the two is the great amount of pubescence on the filaments of *L. exsertum*. *Lycium Fremontii* has much less pubescence on the filaments, and in some cases, practically none.

The plant which Gray described as *L. Fremontii* var. *Bigelovii* is the same as *L. retusum* Robinson and Fernald, and both plants are undoubtedly but a form of *L. exsertum*. Had it not been for the advice of Mr. Peebles, who is making a very careful study of this species in the field, the writer would have made the same error Dr. Gray made when he referred material of this kind to varietal rank under *L. Fremontii*.

The following collections are of this nature, and may be unquestionably referred to *L. exsertum*:

UNITED STATES OF AMERICA

ARIZONA: Santa Rita Mts., Aug. 24, 1903, *Jones* (P); on road to Rincon Mts., from Tucson, March 20, 1930, *Eastwood* 17864

(CA); on road to Rincon Mts., from Tucson, March 19, 1930, *Eastwood* 17815 (CA); Casa Grande, Gila Bend road, north of Table Top Mt., Pinal Co., March 2, 1930, *Fulton* 6435 (MBG, P, SAC); San Tan Mts., Feb. 1, 1930, *Peebles & Loomis* 7464 (P, SAC); San Tan Mts., Feb. 23, 1930, *Peebles* 6404 (MBG, P, US); Tucson Mts., Jan. 21, 1920, *Bartram* 232, glabrate plant (PA); near Tucson, Feb. 2, 1903, *Coville* 1616 (US); Sierra Estrella, Pinal Co., Feb. 16, 1930, *Peebles* 6397 (MBG, P, US); Sierra Estrella, Feb. 16, 1930, *Peebles* 6392 (MBG, P, US); Fresnal, Papago Ind. Reservation, Feb. 9, 1931, *Peebles* 7485 (SAC); on road between Sonoita and Vail, Pima Co., March 18, 1930, *Eastwood* 17794 (CA); Sabino Canyon, Santa Catalina Mts., Pima Co., Jan. 3, 1920, *Bartram* 233 (PA, US); Santa Catalina Mts., Feb. 22, 1901, *Griffiths* 2290 (NY); Tucson, March 3, 1894, *Toumey* (US); infrequent, washes, near Baboquivari Mts., Pima Co., Feb. 24, 1923, alt. 1000 m., *Hanson & Hanson* A1025 (F, MBG, PA); Bill Williams' Fork, Yuma Co., Feb. 8, 1854, *Bigelow* (G TYPE *L. Fremontii* var. *Bigelovii*, NY); Tucson, March 22, 1919, *Eastwood* 8117 (CA); between Roosevelt Dam and Packard, March 11, 1929, *McKelvey* 878 and 879 (CA).

#### MEXICO

SONORA: Oputo, Nov. 1, 1890, alt. 1100 m., *Hartman* 212, TYPE collection of *L. retusum* (G TYPE, US).

36. *L. pallidum* Miers, Ann. & Mag. Nat. Hist. II, 14: 131. 1854, and Ill. S. Amer. Pl. 2: 108, pl. 67C. 1857; Gray, Proc. Amer. Acad. 6: 45. 1862, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238. 1886; Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882; Coulter. Contr. U. S. Nat. Herb. (Bot. W. Tex.) 2: 302. 1892; Woot. & Standl. Contr. U. S. Nat. Herb. (Fl. N. Mex.) 19: 569. 1915; Bailey, Cycl. Hort. 4: 1930. 1916; Rydb. Fl. Rocky Mts. 758. 1917; Tidestrom, Contr. U. S. Nat. Herb. (Fl. Utah & Nev.) 25: 471. 1925; Jepson, Man. Fl. Pl. Calif. 890. 1925. Pl. 18, figs. 6-7.

*L. Schaffneri* Gray in Hemsl. Biol. Cent.-Am. Bot. 2: 426. 1882; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1286. 1924.

*L. pallidum*  $\alpha$  *normale* Terrac. Malpighia 4: 519. 1891.

*L. Berlandieri*  $\alpha$  *normale* var. *Schaffneri* (Gray) Terrac. l. c. 520.

A densely branched, spreading, spiny shrub 1-2 m. tall; branches often somewhat flexuous, yellow, gray, or more commonly reddish to purple, glabrous or rather sparsely pubescent, spines slender, sharp, 0.5-1 cm. long, the longer ones usually somewhat blunt; leaves glaucous-green, glabrous or glabrate, oblong-spatulate to broadly elliptic, or nearly ovate, acute or occasionally rounded, 1-4 cm. long, 3-15 mm. broad, attenuate at base into a short petiole, midnerve and primary lateral nerves usually visible; flowers borne singly or in pairs, pedicels equaling or slightly exceeding the calyx; calyx cup-shaped to campanulate, blue-glaucous and glabrous, 5-8 mm. long,  $\frac{2}{3}$  as broad at summit, 5-lobed, the lobes lanceolate to ovate or elliptic, equaling or even exceeding the tube, their margins sometimes sparsely pubescent; corolla-tube elongate-funnel-form, 12-20 mm. long, about 1.5 mm. in diameter above the ovary, 5-6 mm. in diameter at top where it is expanded conspicuously, greenish with purple veins, often blue-glaucous on outside, the 5 lobes oval or rhombic,  $\frac{1}{5}$ - $\frac{1}{4}$ , the length of the tube, their margins commonly very remotely ciliolate; stamens usually slightly exserted, sometimes extending only to the base of the corolla-lobes, filaments adnate to a little below the middle of the corolla-tube, free base of the filaments and the adjacent corolla-tube hairy, anthers 1.5 mm. long; style varying in length from about equal to corolla-tube to 4 or 5 mm. longer than tube; berry red or reddish-blue due to glaucescence, ovoid, about 1 cm. or slightly less in diameter, 20-50-seeded.

Type: Santa Fe Creek Valley, New Mexico, May, June, 1847, *Fendler* 670 (British Museum).

Distribution: western Texas, southern Colorado, New Mexico, Arizona, southern Utah, and the states of Sonora, Chihuahua, Zacatecas, and San Luis Potosi, Mexico.

Material examined:

UNITED STATES OF AMERICA

LOCALITY UNCERTAIN: *Mex. Bound. Surv.* 1027 (US); valley near Croton Spring, *Mex. Bound. Surv.*, Sept. 9, 1858, *Hayes* (NY); agricultural grounds, Washington, *Dr. Vasey* (G, US); Pacific slope, *Lemmon* (C); Oryabe, on Ives' Colorado Expedition, May 13, *Newberry* (G).

TEXAS: Boquillas, Brewster Co., May 28, 1901, *Bailey* 357 (US); Davis Mts., Jeff Davis Co., Apr. 29, 1902, *Tracy & Earle* 342 (D, F, G, MBG, NY, US).

COLORADO: without locality, *T. S. Brandegee*, coll. of 1878 (US); Trinidad, Las Animas Co., June 13, 1916, *Eastwood* 5540 (CA); McElmo Creek, Montezuma Co., May, 1892, *Eastwood* 6108 (NY, S); dry rocky flat, Cortez, Montezuma Co., Aug. 30, 1919, *Payson* 1124 (MBG); valley of the San Juan, W. Colorado, July, 1875, *T. S. Brandegee* 1084 (C, MBG); Bayfield, La Plata Co., June 5, 1907, *Gary* 175 (US).

NEW MEXICO: Pueblo Indian Ruins, Oct. 14, 1928, *Eastwood* 15549 (CA); bottom-land of Santa Clara River, western New Mexico or southern Utah?, May 11, 1843-44, *Fremont* 474 (NY); without locality, *Fendler*, coll. of 1863 (F); Arizona or N. Mex., coll. of 1847, *Fendler* 668b (G); without locality, *Ellis* 469 (MBG); without locality, May, 1851, *Thurber* 288 (F, G, NY); New Mexico or Arizona, *Rusby* (MBG); Ojo Caliente, July 20, 1894, alt. 2000 m., *B. H. Smith* (PA); El Puerco, coll. of 1874, *Rothrock* 90 (F); between Barranca and Embudo, Taos Co., May 27, 1897, alt. 2000 m., *Heller & Heller* 3599 (G, MBG, NY, P, S, US); Ojo Caliente, Taos Co., July 28, 1904, *Wooton* 2683 (US); 1 mi. w. of Hillsboro, Sierra Co., Apr. 29, 1905, alt. 1800 m., *Metcalfe* 1590 (CA, D, F, G, MBG, NY, P, US); dry hills, vicinity of Cedar Hill, San Juan Co., Aug. 16, 1911, alt. 1900 m., *Standley* 7946 (US); Gallup, McKinley Co., June 14, 1916, *Eastwood* 5594 (CA); Gallup, July 20, 1897, *Herrick* 894 (US); south of Gallup, Aug. 1, 1904, *Wooton* (US); Thoreau, McKinley Co., June 11, 1909, alt. 7400 m., *Goldman* 1586 (US); Ft. Wingate, McKinley Co., coll. of 1883, and of 1882, *Dr. Mathews* (G); Bear Canyon, Sandia Mts., Sandoval Co., May, 1898, *Herrick* 263 (US); Sandia Mts., coll. of 1914, *Ellis* 150 (US); Santa Fe, June 15, 1899, *Diehl* (P); Santa Fe Creek Valley, May-June, 1847, *Fendler* 670, TYPE collection (F, G, NY, MBG); on the mesa about 2 miles east of Albuquerque, Bernalillo Co., coll. of 1915, alt. 1500 m., *Kammerer* 25 (MBG); La Luz Canyon, Lincoln Forest, Otero Co., June 20-23, 1918, alt. 2000 m., *Eggleston* 14363 (G, US); Dog Spring, Dog Mts., Otero Co.?, Sept. 16, 1893, *Mearns* 2327 (US); Dog Spring, June 12, 1892, *Mearns* 304 (US); 30 miles west of Roswell, Chaves Co.,

June 16, 1899, *Bailey* 139 (US); Carrizo Mts., Lincoln Co., May-June, 1892, *Dr. Mathews* (US); near Nogal, Lincoln Co., July 24, 1901, *Wooton* (US); Gray, Lincoln Co., May 12, 1898, alt. 2000 m., *Skehan* 12 (D, G, MBG, NY, P, US); juniper belt, Capitan, Lincoln Co., May 8-19, 1902, *Earle* 637 (NY); Mangas, Catron Co., June, 1897, *Metcalfe* 2 (US); east side of Rio Hondo Valley, San Miguel Co., June 15, 1930, alt. 1300 m., *Goodman & Hitchcock* 1136 (MBG); Silver City, Grant Co., May 9, 1906, *Bailey* (US); Silver City, May 1, 1919, *Eastwood* 8390 (CA); near Santa Rita del Cobre, Grant Co., coll. of 1877, *E. L. Greene* (F); Bear Mt., near Silver City, Grant Co., May 1, 1902, alt. 1500 m., *Metcalfe* 42 (C, D, G, MBG, NY, P, S, US); Fort Bayard, Grant Co., Aug. 2, 1895, *Mulford* 603 (MBG); Bear Tooth Ridge, Fort Bayard Watershed, Nov. 24, 1905, alt. 2000 m., *Blumer* 188 (G, NY, US); Organ Mts., Dona Ana Co., Apr. 30, 1893, *Wooton* (US); Van Pattens, Organ Mts., Apr. 25, 1895, *Wooton* (US); Van Pattens, Organ Mts., July 14, 1895, *Wooton* (US); Deming, Luna Co., Apr. 10, 1911, *Treakle* (P); 10 miles west of Deming, June 16, 1930, *Goodman & Hitchcock* 1150 (MBG).

ARIZONA: Cal-Ariz., coll. of 1876, *Palmer* (G); without locality, *Palmer*, coll. of 1869 (PA, US), *Millspaugh* 213 (G), *Millspaugh* 206 (F); N. Arizona, *Lemmon* 3245 (G); N. E. Ariz., *Fewkes* Expl. Exp. of 1896, Aug. 1-Sept. 5, 1896, *Hough* 71 (US); Arizona, June, 1929, *Driver & Driver* (SBM); without locality, *Voth* 122 (F); near Dudleyville, March 13-Apr. 23, 1903, *Griffiths* 3683V, 3681 (US); hills above Rosemont, March 13-Apr. 23, 1903, *Griffiths* 4130 (MBG, US); San Francisco River, Aug. 8, 1881, *Rusby* 306 (MBG, US); Moki, Aug. 20, 1897, *Zuck* (US); Fort Whipple, May 3, 1865, *Coues, Elliott & Palmer* 361 (G, MBG); on gravelly hillside, Fort Whipple, May 3, 1865, *Coues, Elliott & Palmer* 190 (MBG); Turquoise, May 14, 1894, *W. W. Price* (S); sandy wash, 17 miles south of Animas, Animas Valley, July 9, 1928, *Wolf* 2581 (CA); Cosnino, July 8, 1884, *Jones* (P); Las Cabezas, July, 1894, *Fisher* 2807 (US); Verde Valley, Apr. 7, 1920, *W. W. Jones* 75 (G); Middle Verde, Apr. 8, 1921, *W. W. Jones* (C); Fort Verde, Apr. 11, 1888, *Mearns* 349 (NY); Sanvita Valley and Patagonia Mts., Apr. 1881, *Lemmon* 217 (C); Sanvita Valley, Apr. 1881, *Lemmon* (D, F); Walnut Grove, Apr. 28, 1876, *Palmer* 419 (C, F).

G, MBG, NY, US); Hassayampa River Valley, Apr. 1876, *Palmer* (NY); 6 miles south of Benson, June 20, 1930, *Goodman & Hitchcock* 1237 (MBG); Clifton, Greenlee Co., Apr. 1877, *Davidson* 164 (C); Duncan, Greenlee Co., spring of 1920, *Durant* (P); along road from Roosevelt to Globe, Pinal Co., May 24, 1929, *Eastwood* 17447a (CA); between Roosevelt and Globe, May 18, 1929, *McKelvey* 1077 (ST); near Fort Huachuca, Cochise Co., June, 1894, *Wilcox* 187 (US); Ft. Huachuca, May, 1892, *Wilcox* (NY, US), coll. of 1894, *Wilcox* (MBG); Bajada of Whetstone Mts., Cochise Co., Apr. 15, 1917, *Shreve* 5161 (C, DL, G, US); Quitobasquita, Pima Co., Jan. 28, 1894, *Mearns* 2740 (S, US); San Carlos, Gila Co., June 23, 1904, *Coville* 1903 (US); Buckskin Mts., Yuma Co., June 19, 1890, *Jones* (P); mesa, 2 miles east of Springerville, Apache Co., July 4, 1914, *Ferris* 1229 (CA, S); Navajo Reservation, July, 1916, *Herb. U. of Ariz.* (MBG, US); dry hills, north end of Carrizo Mts., July 30, 1911, *Standley* 2435 (US); Navajo Reservation, July, 1916, *Vorhies* 83 (C, G); Holbrook, Navajo Co., Oct. 9, 1897, *Zuck* (MBG, NY, US); Walnut Canyon, near Flagstaff, Coconino Co., July 11, 1923, alt. 2000 m., *Hanson & Hanson* A641 (MBG); 9 miles northeast of Flagstaff, June 4, 1913, alt. 2200 m., *Goldman* 2053 (US); Flagstaff, *Purpus* (P), May, Oct. 1900, *Purpus* 7091 (C, MBG, P, US); rocky ledge, near Cameron, Coconino Co., June 17, 1922, *Hanson* A130 (MBG, US); San Francisco Mts., Coconino Co., Sept. 5, 1889, *Knowlton* 214 (US); cinder cones east of San Francisco Mts., June 1, 1891, *McDougal* (US); Red Lake, desert near Tuba, Coconino Co., July 15-31, 1920, *Clute* 4 (G, MBG, NY, US); Little Colorado River, Aug. 1896, *Fernon* (US); 1 mile east of Prescott, Yavapai Co., June 28, 1928, *Wolf* 2366 (CA); Ash Fork, Yavapai Co., June 18, 1901, *Barber* 102 (US); between Prescott and Ash Fork, Apr. 26, 1930, *Loomis* 6908 (US); Cherry Creek Road to Prescott, June 1, 1929, *Eastwood* 17625 (C, CA); along road from Prescott to Ash Fork, Nov. 8, 1928, *Eastwood* 16752 (CA); Skull Valley, Yavapai Co., Apr. 28, 1903, alt. 1200 m., *Jones* (MBG, P, US); Peach Springs, Mohave Co., May, 1893, *Wilson* 178 (S, US); Yucca, Mohave Co., May 14, 1884, *Jones* 3903 (C, D, F, NY, P, US).

UTAH: Beaverdam Mts., May 11, 1891, *Bailey* 1951 (US);

without locality, *Vasey* (F); Bluff, San Juan Co., July 1, 1927, *Cottam* 2520 (GAR); sand dunes, Bluff, July 2, 1927, alt. 1300 m., *Cottam* 2543 (GAR); along San Juan R., near Bluff, July 25-29, 1911, alt. 1200-1500 m., *Rydberg & Garrett* 9975 (GAR, NY); Allen Canyon, southwest of Abajo Mts., San Juan Co., July 30-31, 1911, alt. 1800-2000 m., *Rydberg & Garrett* 9295 (NY); Armstrong and White Canyons, near the Natural Bridge, Aug. 4-6, 1911, alt. 1600-1800 m., *Rydberg & Garrett* 9396 (NY); Virgin, Washington Co., Apr. 24, 1930, alt. 1500 m., *Cottam* C4795 (GAR); open prairies and lowlands, Diamond Valley, May 19, 1902, *Goodding* 878 (D, G, MBG, US); Bellevue, Apr. 21, 1888, *Jones* (MBG, P); St. George, May 14, 1894, *Jones* 5215a (P, US); St. George, coll. of 1877, *Palmer* 367 (G, MBG, NY, US); red sand, Rockville, May 15, 1894, alt. 1100 m., *Jones* 5224t (P, US); Zion Canyon, May 7, 1923, *Jones* (P); mesa at Kanab, June 25, 1909, alt. 1480 m., *Tidestrom* 2304 (US).

#### MEXICO

SONORA: without locality, Sept. 1851, *Thurber* (F); Los Ranchos, vicinity of Guaymas, Apr. 23, 1910, *Rose, Standley & Russell* 15031 (US).

CHIHUAHUA: Ojo de Vaca, June 1851, *Thurber* 110 (G, NY).

ZACATECAS: on the road to Huejuquilla near San Juan Capistrano, Aug. 23, 1897, *Rose* 2488 (US).

SAN LUIS POTOSI: 22° N. lat., coll. of 1878, alt. 2000 m., *Parry & Palmer* 655 (G, MBG, PA, US); "ex convalli San Luis Potosi, Sept.-Oct. 1877," *Schaffner* 54, TYPE of *L. Schaffneri* (G); San Luis Potosi, coll. of 1879, *Schaffner* 409 (NY, US); "in montibus," San Luis Potosi, Aug. 1879, *Schaffner* 418 (CA, NY, US); San Luis Potosi, *Schaffner* 419, 420 (F); ex convalli San Luis Potosi, coll. of 1876, *Schaffner* (G).

#### 36a. *L. pallidum* var. *oligospermum* C. L. Hitchcock, var. nov.<sup>\*\*</sup>

Leaves 10-20 mm. long, 3-5 mm. broad; corolla, including lobes, seldom over 20 mm. long; filaments usually densely hairy nearly to top of corolla-tube; berry 6-7 mm. in diameter, 4-8 (usually 4 or 5)-seeded, bluish; seeds 2.5-4 mm. long.

<sup>\*\*</sup> *L. pallidum* Miers var. *oligospermum* C. L. Hitchcock, var. nov.; foliis 10-20 mm. longis, 3-5 mm. latis; corolla 15-20 mm. longa; bacca 4-8-sperma. Collected at Barstow, San Bernardino Co., California, March 5, 1916, alt. 700 m., *Jepson* 6606 (Missouri Botanical Garden Herbarium, no. 836303 TYPE, C, S, US).

Type: Barstow, San Bernardino Co., California, March 5, 1916, alt. 700 m., *Jepson* 6606 (MBG).

Distribution: Mohave Desert of California and adjacent Nevada.

Material seen:

UNITED STATES OF AMERICA

CALIFORNIA: Death Valley, Inyo Co., March 11, 1924, *Jones* (P); Ballarat Grade, Inyo Co., Apr. 2, 1929, *Hoffmann* (SBM); Victorville, San Bernardino Co., March 13, 1927, *Hart* (CA); Barstow, San Bernardino Co., June 4, 1912, alt. 700 m., *Jepson* 4779 (S), May 30, 1914, *Jepson* 6148 (C, MBG); March 5, 1916, alt. 700 m., *Jepson* 6606 (MBG TYPE, C, S, US); 5 miles west of Barstow, March 9, 1914, *Minthorn* (C); stony hills, Garlic Spring, San Bernardino Co., Apr. 25, 1930, *Hoffmann* (SBM); 4 mi. n. of Trona, Inyo Co., Apr. 15, 1932, *Munz & Hitchcock* 12284 (P).

NEVADA: Rhyolite, Apr. 11, 1907, alt. 1200 m., *M. E. Jones* (CA, P, S).

*Lycium pallidum* and its variety may be separated easily from all other American species by the large glaucous leaves, and large, funnel-form corolla. *Lycium Cooperi* is the only species with which it is apt to be confused. The rather dense pubescence and the peculiar "horn-like" lobes of the fruit of the latter species serve adequately to distinguish the two.

37. *L. Cooperi* Gray, Proc. Amer. Acad. 7: 388. 1868; Bot. Calif. 1: 542. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238. 1886; Rydb. Fl. Rocky Mts. 758. 1917; David. & Moxl. Fl. S. Calif. 321. 1923; Jepson, Man. Fl. Pl. Calif. 891. 1925; Tidestrom, Contr. U. S. Nat. Herb. (Fl. Utah & Nev.) 25: 471. 1925.

Pl. 18, figs. 4-5; pl. 13, fig. 6.

*L. Cooperi* var. *pubiflora* Gray, Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238. 1886.

*L. pallidum*  $\alpha$  *normale* var. *Cooperi* (Gray) Terrac. Malpighia 4: 519. 1891.

*L. pallidum*  $\alpha$  *normale* var. *Cooperi* forma *pubiflora* (Gray) Terrac. l. c.

*L. Shockleyi* Gray, Proc. Amer. Acad. 22: 311. 1887.

A stout, spiny, densely branching, heavy shrub 0.7-2 m. tall;

branches thick and rigid, silver to purplish or tan when old, densely pubescent when young, spines short, thick, 3-10 mm. long, blunt; leaves 3-10 in a fascicle, spatulate to obovate-spatulate or oblanceolate, 1-3 cm. long, 0.4-1.0 cm. broad, rounded to truncate at the apex, attenuate at base, glabrate to densely glandular-pubescent or hispidulous, midnerve and some of the lateral nerves usually evident; flowers numerous, 1-3 in a fascicle, borne on pedicels which are about same length as the calyx; calyx bowl-shaped or oblong-campanulate, 8-15 mm. long,  $\frac{1}{3}$ - $\frac{2}{3}$  as broad, glabrate, or much more commonly, glandular-hispidulous, lobes (4) 5, triangular to shortly ovate-lanceolate, from  $\frac{1}{2}$  as long to about the length of the tube, expanding with the growth of the fruit and at length usually ruptured; corolla greenish-white with lavender veins, persistent until the ovary is well developed, tube 8-15 mm. long, nearly cylindric, slightly expanded at top, from densely pubescent to glabrous exteriorly, lobes (4) 5,  $\frac{1}{6}$ - $\frac{1}{4}$  the length of the tube, ovate-triangular, rotate or reflexed, margins usually ciliate; stamens (4) 5, about equaling corolla-tube, or slightly included, filaments equal or subequal, adnate to near the middle of the corolla-tube, free bases of filaments and the vascular strands leading to them covered with long, spreading white hairs, anthers 1 mm. long, or slightly longer; style about equaling stamens, or shorter than they; fruit 5-9 mm. long, frequently 3-carpellary, ovoid, with a wedge-shaped apex, lateral constriction present somewhat above middle, forming 2 compartments nearly separated from one another, 1 (2) seeds in upper half, several (5-8) in lower, wall sclerenchymatous, especially in upper half, greenish-yellow.

Type: eastern slope of Providence Mts., San Bernardino Co., California, May 29, 1861, *Cooper* (G).

Distribution: Mohave and Colorado Deserts of California, eastward to Yuma, Arizona, and northward to Esmeralda County, Nevada, and southwestern Utah.

Material seen:

UNITED STATES OF AMERICA

ARIZONA: Oatman-Kingman road, Mohave Co., March 23, 1931, *Harrison, Kearney & Fulton* 7614 (P, SAC); Yucca, Yuma Co., March 12, 1912, *Wooton* (US); Mica Springs, Apr. 13, 1894,

alt. 1100 m., *Jones* 5045af (P, US); east of Fort Mohave, Apr. 8, 1884, *Lemmon* (C); Ft. Mohave, Apr. 1884, *Lemmon & Lemmon* (C, D); southeastern California or Arizona, coll. of 1876, *Palmer* 66 (G); Beaverdam, northwestern Arizona, coll. of 1877, *Palmer* 364 (G, NY, US); Apr. 5, 1894, alt. 600 m., *Jones* 5012 (C, MBG, P, US).

UTAH: desert near Walker River, June 9, 1889, *H. Engelmann* (MBG).

NEVADA: open sand, Candelaria, May 14, 1882, *Shockley* 219 (C, G TYPE of *L. Shockleyi*, NY, S, US in part); Gold Mt., Esmeralda Co., June 3, 1891, *Bailey* 2005 (US); Meadow Valley Wash, Apr. 6, 1905, *Gooodding* 2160 (G, MBG); Good Springs, Apr. 30, 1905, *Jones* (P); Hawthorne, Apr. 22, 1907, alt. 1600 m., *Jones* (P).

CALIFORNIA: June 9, 1889, *Simpson's Exped.* (MBG); Mohave Desert, May 18, 1882, *Pringle* (D, F, G, NY, PA, US); Mohave Desert, coll. of 1895, *Davidson* (C), Apr.-May, 1906, *Saunders* (PA); 6 miles from Darwin on road to Owen's Valley, Inyo Co., June 11, 1930, *Ferris* 7912 (C); in canyon, Darwin, Keeler Road, 10 miles from Keeler, Inyo Co., Apr. 29, 1928, *Ferris* 7432 (NY); Darwin Mesa, June 11, 1891, alt. 1500 m., *Coville & Funston* 907 (US); Willow Creek Canyon, Panamint Mts., May 22, 1891, *Coville & Funston* 826 (US); Mountain Spring Canyon, Inyo Co., May 8, 1929, *Hoffmann* (SBM); near Crystal, Cosa Mts., Inyo Co., June 12, 1891, alt. 1830 m., *Coville & Funston* 929 (US); sandy flat, 15 miles north of Muroc, Kern Co., Apr. 27, 1929, *Hoffmann* (SBM); region of Tehachapi Peak, June, 1895, alt. 2300 m., *Dudley* (S); Maricopa Hills, Kern Co., March 15, 1913, *Eastwood* 3274 (CA, G, US); rocky hills between Rosamund and Mojave, Kern Co., Apr. 30, 1927, *Abrams* 11755 (P, S); head of Kelso Valley, 16 miles south-southwest of Weldon, Kern Co., alt. 1500 m., *Cal. Mus. Vert. Zool.* (C); sand-dunes, halfway from Bakersfield to Tejon Pass, March 19, 1925, *Munz* 8999 (C, P); between Willow Springs and Tehachapi, Mohave Desert, June 25, 1908, *Abrams & MacGregor* 836 (D, G, NY, S, US); Willow Springs, Kern Co., July 1, 1905, *F. Grinnell* 444 (US), July 1, 1905, *F. Grinnell* 447 (US); Oak Creek, Kern Co., June 20, 1905, *F. Grinnell* 415 (US); rocky alluvial slope, east slope of Walker Pass,

Kern Co., May 13, 1930, alt. 1300 m., *J. T. Howell* 4999 (CA); near Acton, May 21, 1893, alt. 900 m., *Hasse* (S); Palmdale, Los Angeles Co., June, 1902, *Elmer* 3661 (D, G, MBG, NY, P, S, US, V); Lancaster, Los Angeles Co., May, 1895, *Davidson* (C); Little Rock Creek, Los Angeles Co., May 19, 1921, alt. 1000 m., *Peirson* 1086 (S); Mohave, May 20, 1903, *Jones* (P); Antelope Valley, Los Angeles Co., Apr. 19, 1925, *Hoffmann* (SBM); among rocks, Vorligger Spring, Goffs, Lanfair Road, San Bernardino Co., Apr. 23, 1928, alt. 1100 m., *Ferris* 7254 (NY); Kramer, Mohave Desert, May 1, 1913, alt. 800 m., *Jepson* 5329 (G); sandy soil, Argus Mts., Apr.-Sept. 1897, alt. 1500 m., *Purpus* (C, G, MBG, US); Morongo Pass, San Bernardino Co., Apr. 1882, *Parish & Parish* 1196 (C, F, G, S); Granite Mts., San Bernardino Co., Apr. 25, 1930, alt. 1000 m., *Hoffmann* (SBM); San Bernardino Range, May, 1893, alt. 800 m., *Hasse* (NY); open desert, southwest of Deadman's Point, Mohave Desert, San Bernardino Co., June 12, 1927, alt. 1000 m., *Howell* 2502 (CA); Deadman's Point, May 16, 1920, alt. 1000 m., *Johnston* (P); vicinity of Bonanza King Mine, eastern slope of Providence Mts., Mohave Desert, May 21-24, 1920, alt. 800 m., *Munz, Johnston & Harwood* 4026 (C, P, S, US); Pine Tree Ranch, south end of Providence Mts., Mohave Desert, Apr. 13, 1930, *Hilend* 383 (UCLA); eastern slope of Providence Mts., May 29, 1861, *Cooper* (G TYPE, US); Barnwell, southeastern Mohave Desert, San Bernardino Co., May, 1911, *K. Brandegee* (C); Hesperia, San Bernardino Co., Apr. 28, 1917, alt. 1000 m., *Spencer* 372 (G, P); Coolgardie, Calico Mts., Yucca Mesa, March 27, 1916, *Jepson* 6636 (US); desert sand, near Hinckley, Mohave Desert, Apr. 17, 1920, alt. 700 m., *Spencer* 372 (NY, P); Pipe Canyon, eastern base of San Bernardino Mts., June 16, 1894, alt. 1500 m., *Parish* 2989 (MBG, US); 3 miles east of Warren's Well, Little San Bernardino Mts., May 6, 1922, alt. 1100 m., *Munz & Johnston* 5200b (P); desert side Cajon Pass, May 30, 1918, *Parish* 11847 (C); Mohave River, San Bernardino Co., June 1, 1876, *Palmer* 420 (C, CA, F, G, MBG, NY), May 31, 1892, *Parish* 2438 (F); Victorville, March 25, 1907, *J. Grinnell* (US), May, 1905, *Hall* 6194 (C); between Victorville and Mohave, May 24, 1926, *Hart* 1 (CA); between Barstow and Victorville, May 14, 1922, *Hart* 61 (CA); Victorville, Aug. 8, 1917, *Johnston* 1767 (C).

P), July 8, 1917, *Johnston* 1769 (C, P), May 16, 1920, *Johnston* (P); Victor, June 25–27, 1888, *Palmer* 223½ (NY); Victorville, Apr. 27, 1915, *Parish* 9695 (S); southeastern Calif.-Ariz., coll. of 1876, *Palmer* (G TYPE of *L. Cooperi* var. *pubiflora*); Mohave River, southeastern California, coll. of 1876, *Palmer* 420 (F, MBG, PA, US); La Puente, Colorado Desert, Apr. 1, 1914, *Parish* 9048 (S); 14 miles south of Needles, March 22, 1921, *Harrison*, *Kearney* & *Fulton* 7530 (MBG, SAC); Shepherd's Canyon, Apr. 30, 1897, alt. 1500 m., *Jones* (P); Salton, Colorado Desert, Riverside Co., May, 1905, alt. 650 m., *Hall* 6031 (C); San Felipe, Apr. 13, 1896, and Apr. 27, 1894, *K. Brandegee* (C); San Felipe Hill, Apr. 19, 1906, alt. 800 m., *Jones* (P).

Gray's variety *pubiflora* cannot be maintained, as flowers taken at random from plants collected in almost any locality show a wide range of variation in respect to the amount of pubescence on the corolla. Also, *L. Shockleyi* must fall to synonymy under *L. Cooperi*. The type, collected at Candelaria, Nevada, has large calyces that have been much expanded by the growing fruit, thus making the nerves very prominent. This condition is unusual, but is apparently a fortuitous or abnormal variation, as, in addition to the above plant, the following collections show this peculiarity, at least to some extent: Walker River, Utah, June 9, 1889, *H. Engelmann* (MBG); Mohave River, San Bernardino Co., California, *Parish* 2438 (F); Victorville, San Bernardino Co., *Johnston* 1767 (C, P). Jones' plant from Hawthorne, Nevada, Apr. 22, 1907 (P), is unusual in being almost devoid of all pubescence.

The nature of the fruit is sufficient to separate *L. Cooperi* from any other member of the genus in North or South America. In addition, the great amount of pubescence commonly present serves to distinguish it from *L. pallidum*, the species with which it has been most frequently confused.

38. *L. macrodon* Gray, Proc. Amer. Acad. 6: 45. 1862; Bot. Calif. 1: 542. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238, 437. 1886; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1286. 1924. Pl. 12, figs. 1–3; pl. 13, fig. 1; pl. 18, figs. 19–21.

*L. pallidum* γ *macrodon* (Gray) Terrac. *Malpighia* 4: 520. 1891.  
A much-branched, somewhat spreading, spiny, pubescent shrub 1-3 m. tall; branches rather slender, curved, chalky-gray to reddish, young twigs covered with gray tomentum, spines blunt, 2-5 mm. long; leaves linear-spatulate to narrowly oblong-ob lanceolate, 6-30 mm. long, 2-5 mm. wide, acute to rounded at apex, gradually attenuate to a petiole 1-2 mm. long, bright green, minutely but abundantly pubescent; calyx campanulate, pubescent, 6-8 mm. long, the 5 linear lobes about twice the length of the tube, acute, sinuses rounded or truncate; corolla white or pale lilac, tube greenish-white, conspicuously contracted above ovary, 9-12 mm. long, 2.5-3 mm. in diameter at the summit, glabrous without, lobes 5, ovate-triangular, 2-3 mm. long, rotate, their margins slightly revolute and very remotely ciliolate; stamens equalling or exceeding corolla-tube slightly; filaments subequal, adnate about half the length of the corolla-tube, rather densely clothed with long hairs for about 1 mm. above the adnate portion, corolla-tube hairy from free base of filament almost to base of corolla, anthers 1.5 mm. long; style 2-3 mm. shorter than stamens; fruit 2-3-carpellary, each carpel with hardened pericarp, constricted about  $\frac{1}{4}$  the way from base, with 1 or 2 large seeds in each carpel above constriction, 1-several abortive ovules or incompletely developed seeds in lower half, lower half with less hardened pericarp.

Type: "Fremont Exped. California, 1849." (NY). The type was very probably collected in southern Arizona.

Distribution: southern Arizona, and adjacent Sonora, Mexico.

Material seen:

#### UNITED STATES OF AMERICA

ARIZONA: no locality indicated, but undoubtedly in southern Arizona, *Fremont Exped. California*, coll. of 1849 (NY TYPE); Arizona, coll. of 1884, *Pringle* (NY); base of Tinajas Altas Mts., March 28, 1930, *Harrison & Kearney* 6571 (US); Sacaton, March 19, 1919, *Eastwood* 8082 (US), and 8028 (CA), spring of 1908, *Gilman* 2408 (US), March 6, 1926, *Loomis* 968 (US), March 15, 1930, *Peebles* 6455 (P, SAC), Apr. 22, 1930, *Peebles & Kearney* 6702 (MBG, P, US); Santa Rosa to Casa Grande, March 13-Apr. 23, 1903, *Griffiths* 4031 (US); near Casa Grande, March 20, 1930,

*Peebles & Harrison 6461* (US), Feb. 6, 1931, *Peebles 7484* (MBG, P, SAC); Pinal Co., March 5, 1931, *Peebles 7510* (SAC); on flats, near Magma, Pinal Co., Feb. 28, 1930, *Peebles & Loomis 6432* (MBG, P, US); near Gila Crossing, Pima Indian Reservation, Maricopa Co., March 12, 1930, *Peebles 6442* (MBG, P, US); Wellton, Yuma Co., March 2, 1927, *Harrison 3584* (US); about 5 miles east of Wenden, Yuma Co., March 21, 1931, *Harrison, Kearney & Fulton 7525* (P, SAC).

#### MEXICO

SONORA: vicinity of Navajoa, March 21, 1910, *Rose, Standley & Russell 13157* (NY, US); valley of the Altar River, Caborca, March 24, 1884, *Pringle* (CA, D, F, G, NY, PA, US); vicinity of Hermosillo, March 6, 1910, *Rose, Standley & Russell 12443* (US, but not NY).

*Lycium macrodon* is very easily recognized by its remarkably long calyx-lobes, the only other North American species having a calyx approaching it being *L. Richii*. The fruit, however, is entirely dissimilar in the two.

39. *L. puberulum* Gray, Proc. Amer. Acad. 6: 46. 1862, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238. 1886; Coulter, Contr. U. S. Nat. Herb. (Bot. W. Tex.) 2: 301. 1892; Standley, Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1286. 1924. Pl. 18, figs. 22-24.

A sparingly branched, spiny shrub 0.7-1.5 m. tall; branches usually slender and flexuous, well armed with slender, needle-like spines 5-10 mm. long, dark grayish-green to olive-purple, glabrous at least in age; leaves 3-6 in a fascicle, broadly elliptic to oblong-ovate, 5-15 mm. long, about  $\frac{1}{3}$  as broad as long, rounded at apex, sessile or subsessile, densely short-pubescent, not fleshy, midnerve evident; flowers 1-2 in the leaf fascicles, pedicels about 2 mm. long; calyx broadly campanulate, 4-6 mm. long, very densely short-pubescent, somewhat glandular, the 5 lobes oblong-ovate, equal to or twice the length of the calyx-tube, pubescent on both surfaces; corolla tubular-campanulate, "tube white, limb yellowish-green," tubular portion 9-12 mm. long, 1.5 mm. wide at base, about 3 mm. in diameter at top, glabrous without, lobes 5, ovate,  $\frac{1}{6}$ - $\frac{1}{4}$  the length of the tube, commonly reflexed, their margins not ciliate; stamens equal to corolla-tube or slightly

shorter, filaments equal or subequal, adnate to the corolla-tube for about  $\frac{2}{3}$  of its length, glabrate, but the lower  $\frac{2}{3}$  of the corolla-tube densely hairy, anthers 1 mm. or less long; style equalling filaments or slightly shorter than they, included in corolla-tube; fruit sclerenchymatous, 1 or 2 seeds in each carpel.

Type: El Paso, Texas, *Wright* 1609 (G).

Distribution: southern Texas, along the Rio Grande River.

Material seen:

UNITED STATES OF AMERICA

TEXAS: on the Rio Grande River, June 15, 1858, *Hayes* (US); Presidio, March 25, 188-, *Havard*, (US); Texas, *Havard* (F); Presidio, western Texas, March, 1881, *Havard* 158, 159 (G, P, S); foothills of Chisos and plains, Aug. 1883, *Havard* 91 (US); stony hills on the Rio Grande, between ? and San Eleaganio, Mex. Bound. Surv., *Wright* (NY); El Paso, *Wright* 1609 (F, G TYPE, MBG); Indian Hot Springs, Apr. 30, 1930, *Jones* 26242 (MBG, P).

Most of the material that has been seen has no fruits; however, in the packet on one of the sheets from the United States National Herbarium (no. 55689), collected by Sutton Hayes, on the Rio Grande River, Texas, June 15, 1858, there are some fruits which presumably belong to the specimen mounted on the sheet. These fruits are two-seeded, with a hardened pericarp, apparently being the same type of fruit as that of *L. macrodon*. Jones' collection has mature fruits and proves that the species is very similar to *L. macrodon* in this character.

As the name suggests, *L. puberulum* is conspicuous because of the dense pubescence on the calyx and leaves; it is simulated in calyx-characters by *L. Cooperi* and *L. Parishii*, but need not be confused with either because of the difference in the fruit characters. In *L. Cooperi* the calyx is much larger than in *L. puberulum* and the tube is longer in proportion to the lobes.

Section II. SELIDOPHORA C. L. Hitchcock.

Section SELIDOPHORA C. L. Hitchcock, sect. nov.

Carpels many-ovuled. Fruit fleshy, many-seeded. Filaments enlarged and glandular at base, glandular portion with fringe of cilia.

## KEY TO SPECIES

- A. Calyx-lobes as long as, or much longer than, calyx-tube; leaves 5-25 mm. broad. .... 43. *L. ciliatum*
- AA. Calyx-lobes usually not longer than calyx-tube; leaves seldom over 5 mm. broad.
  - B. Corolla pubescent exteriorly near the base.
    - C. Plants dwarf, spreading, 1-2 dm. tall; corolla-tube 2.5-3.5 mm. long, but little greater in diameter at top than at bottom. .... 42. *L. Vergarae*
    - CC. Plants 4-25 dm. tall; corolla-tube 3-5 mm. long, 2-3 times as great in diameter at top as at bottom. .... 41. *L. chilense*
  - BB. Corolla glabrous exteriorly near the base. .... 40. *L. Comberi*

40. *L. Comberi* C. L. Hitchcock, sp. nov.<sup>59</sup>

Pl. 19, figs. 13-15; pl. 24.

A very leafy, heavy, much-branched, spreading shrub 0.5-2 m. tall; branches exceedingly knotty, heavy, and rigid, spines confined to pungent tips of short, thick, lateral branchlets, not sharp, bark silvery when young, dark gray-black, much cracked and furrowed on older branches, the nodes enlarged, very close together (1-3 mm.); leaves 3-9 in a fascicle, linear, 5-20 mm. long, 1 mm. broad, rather thickly beset with very short, stiff, simple or forked hairs; flowers "pale yellow, very sweetly scented," very numerous, 1-2 at a node, on pedicels 5-10 mm. long; calyx campanulate, 3.5-5 mm. long, about 2 mm. in diameter, tube 2-3 times as long as the lobes, nearly glabrous or somewhat puberulent, lobes 5, triangular-acute, their margins densely ciliate; corolla-tube infundibuliform, 4-5 mm. long, about 3 mm. in diameter at summit, 2 mm. or less in diameter at base, glabrous exteriorly, lobes 5, 3-4 mm. long (about  $\frac{2}{3}$  the length of the corolla-tube), oblong, spreading or reflexed, usually with revolute, ciliate margins; stamens 5, subequal, exserted 2-4 mm. from corolla-tube, filaments nearly equalling corolla-lobes, adnate to

<sup>59</sup> *L. Comberi* C. L. Hitchcock, sp. nov., fruticosum, foliosissimum, ramosissimum, 0.5-2 m. altum; foliis linearibus, 5-20 mm. longis, 1 mm. latis, 3-9-fasciculatis, hispidulosis; floribus numerosis, luteolis, pedicellis 5-10 mm. longis; calyce campanulato, 3.5-5 mm. longo, 2 mm. in diametro, 5-fido, tubo lobis 2-3-plo longiore; corollae tubo infundibuliformi, 4-5 mm. longo, ad verticem 3 mm. in diametro, ad basem 2 mm. vel minore lato, extra glabro, 5-fido, lobis 3-4 mm. longis; staminibus subaequalibus, e corollae tubo 2-3 mm. exsertibus, corollae tubi partem tertiam inferam adhaerentibus, ad basem amplificatis, glandulosis, fimbriato-glandulosisque; stylo 1-2 mm. staminibus longiore; bacca ignota. Collected at Zapala, Terr. Neuquen, Andes of Argentina, 38° 41' S, Aug. 11, 1925, Comber 127 (KEW).

the corolla-tube for about  $\frac{1}{6}$  its length, glabrous at point of adnation, but enlarged, glandular, and with a fringe of hairs just above this point, adjacent corolla-tube pubescent between filaments, anthers about 1 mm. long; style 1-2 mm. longer than stamens; berry not seen.

Type: Zapala, Terr. Neuquen, Andes of Argentina,  $38^{\circ} 41' S$ , Aug. 11, 1925, Comber 127 (KEW).

Distribution: known only from type locality.

Material seen: only the type specimen has been seen.

This specimen was labelled "L. puberulentum," but it is amply distinct from that species. It is readily distinguished from all other members of the genus by the glandular-based filaments, coupled with the exteriorly glabrous corolla-tube and the shape of the calyx-tube.

41. *L. chilense* Miers ex Bertero, Merc. Chil. 15: 693. 1829, and Ruschenberger in Amer. Jour. Sci. 23: 96. 1832, English translation; A. DC. 5<sup>me</sup> Not. Pl. Rar. Nouv. Jard. Bot. Genève 23. 1833 (Mem. Soc. Phys. & d'Hist. Nat. Genève 6: 231. 1833); Colla, Mem. Accad. Sci. Tor. (Pl. Rar. Reg. Chil.) 38: 133, pl. 44. 1835 (date from Ind. Lond.); Walp. Rep. Bot. Syst. 3: 108. 1844; Remy in Gay, Hist. Chil. Bot. 5: 92. 1849; Dunal in DC. Prodr. 13<sup>1</sup>: 514. 1852; Miers, Ann. & Mag. Nat. Hist. II, 14: 338. 1854, and Ill. S. Amer. Pl. 2: 131, pl. 72D. 1857; Reiche, Anal. Univ. Chil. 123: 393. 1908, and Fl. Chil. 5: 313. 1910; Bailey, Cycl. Hort. 4: 1930. 1916. Pl. 19, figs. 4-6.

*L. chilense* var. *glaberrimum* Phillipi, Linnaea 33: 206. 1864.

*L. chilense*  $\alpha$  *normale* Terrac. Malpighia 4: 528. 1891.

*L. chilense*  $\alpha$  *normale* var. *gracile* (Meyen) Terrac. l. c.

*L. chilense*  $\alpha$  *normale* f. *glaberrima* (Philippi) Terrac. l. c.

*L. chilense*  $\beta$  *rachidocladum* var. *capillare* subvar. *filifolium* (Gill.) Terrac. l. c. 529.

*L. chilense*  $\beta$  *rachidocladum* var. *capillare* subvar. *filifolium* forma *minutifolium* (Walp.) Terrac. l. c. 530 (should be (Miers) Terrac.).

*L. chilense* var. *ovatum* Philippi, Anal. Univ. Chil. 91: 21. 1895.

*L. chilense* var. *petiolatum* Philippi, l. c.

*L. chilense* var. *tomentosulum* Philippi, l. c.

*L. chilense* var. *glabriuscula* Philippi, *l. c.* 22.  
*L. chilense* subsp. *normale* Reiche, *Anal. Univ. Chil.* **123**: 393. 1908, and *Fl. Chil.* **5**: 314. 1910.  
*L. chilense* subsp. *normale* var. *tomentosulum* (Phil.) Reiche, *Anal. Univ. Chil.* **123**: 394. 1908, and *Fl. Chil.* **5**: 314. 1910.  
*L. chilense* subsp. *normale* var. *ovatum* (Philippi) Reiche, *Anal. Univ. Chil.* **123**: 394. 1908, and *Fl. Chil.* **5**: 314. 1910.  
*L. chilense* subsp. *normale* var. *venosum* (Philippi) Reiche, *Anal. Univ. Chil.* **123**: 394. 1908, and *Fl. Chil.* **5**: 314. 1910.  
*L. chilense* subsp. *normale* var. *glaberrima* (Philippi) Reiche, *Anal. Univ. Chil.* **123**: 394. 1908, and *Fl. Chil.* **5**: 314. 1910.  
*L. chilense* subsp. *gracile* var. *gracile* Reiche, *Anal. Univ. Chil.* **123**: 395. 1908, and *Fl. Chil.* **5**: 315. 1910.  
*L. chilense* subsp. *paraguariense* Hassler in Fedde, *Rep. Spec. Nov. 15*: 240. 1918, in part, at least as to *L. gracile* Meyen.  
*L. chilense* var. *normale* Hassler, *l. c.*  
*L. nutans* DC. 5<sup>me</sup> Not. Pl. Rar. *Nouv. Jard. Bot. Genève* **24**. 1833 (Mem. Soc. Phys. & d'Hist. Nat. *Genève* **6**: 232. 1833) (herb. name of Poeppig).  
*L. gracile* Meyen, *Reise um die Erde* **1**: 380. 1834 (footnote); Nees, *Nov. Act. Acad. Caes. Leop.* **19**, suppl. **1**: 389. 1843; Walp. *Rep. Bot. Syst.* **3**: 108. 1844; Remy in Gay, *Hist. Chil. Bot.* **5**: 92. 1849; Philippi, *Anal. Univ. Chil.* **91**: 24. 1895.  
*L. canum* Gill. in Walp. *Rep. Bot. Syst.* **3**: 112. 1844, nomen.  
*L. filifolium* Gill. ex Miers, *Ann. & Mag. Nat. Hist.* II, **14**: 336. 1854, and *Ill. S. Amer. Pl.* **2**: 130, *pl. 72B*. 1857.  
*L. filifolium* var. *minutifolium* Miers, *Ann. & Mag. Nat. Hist.* II, **14**: 337. 1854, and *Ill. S. Amer. Pl.* **2**: 130. 1857.  
*L. patagonicum* Miers, *Ann. & Mag. Nat. Hist.* II, **14**: 340. 1854, and *Ill. S. Amer. Pl.* **2**: 133, *pl. 72F*. 1857; Speg. *Rev. Fac. Agr. y Vet. La Plata* (*Pl. Patag. Austr.*) **3**: 552. 1897.  
*L. patagonicum*  $\alpha$  *normale* Terrac. *Malpighia* **4**: 533. 1891.  
*L. Grevilleanum* Gill. ex Miers, *Ann. & Mag. Nat. Hist.* II, **14**: 342. 1854, and *Ill. S. Amer. Pl.* **2**: 135, *pl. 73F*. 1857.  
*L. scoparium* Miers, *Ann. & Mag. Nat. Hist.* II, **14**: 340. 1854, and *Ill. S. Amer. Pl.* **2**: 134, *pl. 73A*. 1857; Griseb. *Abhandl. König. Ges. Wiss. Gött. (Symb. Fl. Arg.)* **24**: 246. 1879.  
*L. scoparium*  $\alpha$  *normale* Terrac. *Malpighia* **4**: 532. 1891.

*L. scoparium* var. *lineare* Miers, Ann. & Mag. Nat. Hist. II, 14: 341. 1854, and Ill. S. Amer. Pl. 2: 134, pl. 73B. 1857.

*L. scoparium*  $\alpha$  *normale* *lusus lineare* (Miers) Terrac. l. c.

*L. scoparium* var. *confertifolium* Miers, Ann. & Mag. Nat. Hist. II, 14: 341. 1854, and Ill. S. Amer. Pl. 2: 135, pl. 73C. 1857.

*L. scoparium*  $\alpha$  *normale* *lusus confertiflorum* (Miers) Terrac. l. c. (should be *confertifolium*).

*L. scoparium* var. *divaricatum* Miers, Ann. & Mag. Nat. Hist. II, 14: 341. 1854, and Ill. S. Amer. Pl. 2: 135, pl. 73D. 1857.

*L. scoparium*  $\alpha$  *normale* *lusus divaricatum* (Miers) Terrac. l. c.

*L. scoparium* var. *affine* Miers, Ann. & Mag. Nat. Hist. II, 14: 342. 1854, and Ill. S. Amer. Pl. 2: 135, pl. 73E. 1857.

*L. scoparium*  $\alpha$  *normale* *lusus affine* (Miers) Terrac. l. c.

*L. scoparium* var. *calycinum* Griseb. Abhandl. König. Ges. Wiss. Gött. (Symb. Fl. Arg.) 24: 246. 1879 (judging from description).

*L. scoparium*  $\alpha$  *normale* *lusus calycinum* (Griseb.) Terrac. l. c.

*L. scoparium*  $\alpha$  *normale* *lusus Grevilleanum* (Gill.) Terrac. l. c.

*L. gelidum* Wedd. Chlor. And. 2: 108. 1857.

*L. sessiliflorum* Philippi, Anal. Univ. Chil. 91: 22. 1895 (judging from description).

*L. lasiopetalum* Speg. Anal. Soc. Cient. Arg. 53: 170. 1902.

*L. pulverulentum* Skottsb. Kungl. Svensk. Vetens.-Akad. Handl. (Bot. Ergeb. Schw. Exp. Patag. 1907-9) 56: 294. 1916.

A somewhat trailing or spreading, sparingly armed or unarmed, pubescent shrub 0.4-2.5 m. tall, pubescence simple or branched; branches usually slender, frequently flexuous, sometimes prostrate, usually grayish, sometimes very dark, pubescent with stellate or forked hairs when young, the spines when present few and not very sharp; leaves in fascicles of 1-6, exceedingly variable, linear to ovate or spatulate, 1-3 cm. long, 0.5-6 (8) mm. broad, sessile or petiolate, acute to rounded, pubescent with multicellular stellate hairs, frequently with simple hairs intermixed, or occasionally with only unbranched hairs; flowers borne singly or in 2's or 3's, on pedicels 2-10 mm. long, pubescent; calyx cup-shaped, usually pubescent with branched hairs, tube 1.5-3 mm. long, lobes 5, short-triangular to linear or spatulate, 1-3 mm. long;

corolla greenish with purple lobes and veins, broadly infundibuliform, tubular portion 3–5 mm. long, 2–3 times as wide at summit as at top of ovary, with pilose band about 1 mm. above base, rest of tube less abundantly pubescent or glabrous, lobes 5, oblong-ovate, about equal in length to tube or somewhat shorter, spreading or slightly reflexed, ciliate, more or less pubescent exteriorly; stamens 5, exserted, filaments equal or subequal, equal to or slightly shorter than corolla-lobes, adnate to near the middle of the corolla-tube, enlarged and glandular at base, the glandular surface fringed with a row of rather long cilia, adjacent corolla-tube with tuft of hairs between stamen bases, anthers 1–1.5 mm. long; style equalling or 1–2 mm. longer than stamens; ovary ovoid, 4–6 mm. long,  $\frac{1}{2}$ – $\frac{1}{2}$  as thick, red, many-seeded.

Type: no type specified, but "in sylvaticis montis la Leona, in rupestribus St. Jago, Nov. 1828, Bertero 396," which is represented in many of the herbaria of the world may be taken as representative of the species as Bertero understood it.

Distribution: Chile, from Atacama southward to Concepcion, inland to central Argentina and southward to Terr. Santa Cruz, Argentina.

Material seen:

CHILE: without locality, Gay (G), Lechler (V); coll. of 1829, Bertero 420 (D); San Antonio, Oct. 1921, Claude-Joseph 1729 (US); in sylvaticis montis la Leona, in rupestribus St. Jago, Nov. 1828, Bertero 396 (D, MBG, NY, V); Copiapo, Feb. 1888, Philippi (KEW); Prov. Coquimbo, coll. of 1838, Gay (MBG photograph of TYPE of *L. gelidum* at Paris); Coquimbo, E. C. Reed (KEW); San Felipe, Prov. Aconcagua, Nov. 1923, Claude-Joseph 2507 (US); Concon, Prov. Valparaiso, Miers 328 (US); Valparaiso, Wilkes Expl. Exped. (US); Valparaiso, coll. of 1832, Gaudichaud 117 (D); Valparaiso, coll. of 1830, Bridges (KEW); prope Valparaiso, coll. of 1831, Cuming 367 (KEW, V); Pudahuel, Prov. Santiago, E. C. Reed (G); Lampa, Prov. Santiago, Nov. 1869, E. C. Reed (KEW); Cerro Blanco, vicinity of Santiago, Nov. 16, 1900, Hastings 169 (C, US); Santiago, sterile hills near city, Sept. 22, 1900, Hastings 50 (NY); Santiago, Dec. 1922, Claude-Joseph 2224 (US); Santiago, coll. of 1856–57, Germain (KEW, V); San Antonio, Prov. Santiago, Dept. San Antonio, Oct. 16, 1927, alt.

18 m., *Montero* 210 (G, MBG); ex saxosis Chilensibus juxta Santiago, Cerro de San Cristobal, May 14, 1882, *J. Ball* (KEW); Cerro S. Cristobal, Santiago, Oct. 7, 1928, alt. 700-800 m., *Looser* 773 (G); Prov. Santiago, *E. C. Reed* (KEW); Jahuel, Prov. O'Higgins, Oct. 1927, *Elliott* 211 (KEW); prope la Concepcion, Oct. 1825, *Macrae* (D, KEW); Renaca, 6 kilom. al Norte de Viña del mar, Feb. 1911, *Jaffuel* 881 (G); in collib. arenis marit. ad Concon, Sept. 1827, *Poeppig* 85 (= 238?) (V).

ARGENTINA: Fenix-Islen, Patagonia, Terr. Santa Cruz, Oct. 12, 1908, *Skottsberg* 624 (ST TYPE of *L. pulverulentum*); Zapala, Neuguen, Feb. 1930, *Hauman* (MBG); Santa Cruz, Feb. 1903, *Cardoso* (MBG); Patagonia andina, Dec. 10, 1908, *Skottsberg* 624 (ST); Port St. Elena, Patagonia, *Capt. King* (KEW TYPE collection of *L. patagonicum*); Puerto, San Antonio, eastern Patagonia, in arenos mobili, Dec. 10, 1904, *Dusén* 5239 (ST); Terr. Santa Cruz, Nov. 20, 1928, alt. 200 m., *Donat* 147 (MBG); island in Rio Chico, 150 miles west by north of Puerto San Julian, Terr. Santa Cruz, coll. of 1928, *Blake* (KEW); head of Rio Negro, Dec. 1891, *Andrews* 36 (KEW); Puerto Madryn, Terr. Chubut, Apr. 1914, *Hauman* (MBG); Valle de Escalante, Terr. Chubut, Dec. 20, 1929, *Ferruglio* (MBG); Camarones, Terr. Chubut, coll. of 1912, *Aurelius* 5 (ST); Chubut, Meseta de Espinosa, Nov. 1929, *Ferruglio* (MBG); Patagonia, lat. 50° 30' S, coll. of 1882, *Moreno* & *Tonini* 528 (NY); Paso Cruz, lat. 34° S, alt. 1600 m., *Kuntze* (US); vicinity of General Roca, Rio Negro, Sept. 1914-Feb. 1915, alt. 250-360 m., *Fischer* 17 (F, G, KEW, MBG, NY, US); Loberias de Viedma, Rio Negro, Nov. 15, 1928, *Castellanos* (MBG); Viedma, camino al faro, Rio Negro, Nov. 14, 1928, *Castellanos* (MBG); El. Jafuel, Cordillera de Larioja, March 3, 1879, *Hieronymus* & *Niederlein* (KEW); San Luis, Chisaca, Dec. 14 & 19, 1925, *Castellanos* (MBG); Nogoli, Feb. 10, 1925, *Castellanos* (MBG); San Francisco, Feb. 12, 1925, *Castellanos* (MBG); Alto del Yeso, mt. range in Prov. San Luis (bordering Mendoza), *Miers* 651 (US TYPE collection of *L. scoparium*); Mendoza, *Philippi* (V); ex regione inferiori Andinum Chilensium, juxta Santa Rosa de los Andes, Prov. Mendoza?, May, 1882, *Ball* (G, KEW, NY); Tupungato, Prov. Mendoza, Dec. 1916, *Ruiz* 253 (MBG); Moreno (in puma de Jujuy), in declivibus montis saxo-

sis apricis siccis, Prov. Jujuy, Nov. 11, 1904, alt. 3500 m., *Fries* 751 (ST); Rodeo, San Juan, Dec. 20, 1929, *Moreau* (MBG); Copres, Salta, March 3, 1927, *Castellanos* (MBG); Sierras Pampeanus, Feb.-Apr. 1881, *Lorentz* (ST, V); San Francisco, Catamarca, Jan. 31, 1930, *Castellanos* (MBG); Chacra de la Merced, near Cordoba, Oct. 1887, *Hieronymus* (KEW); Curaco, Pampa Central, Jan. 8, 1927, *Castellanos* (MBG); Sierras Pampeanus, coll. of 1887, *Lorentz* 109 (US); Quehué por Utracan, Pampa Central, Jan. 7, 1927, *Castellanos* (MBG); Paso Cruz, Jan. 1892, *Kuntze* (NY, US); Cerro Peña, Prov. Jujuy, Feb. 8, 1927, alt. 3000 m., *Venturi* 4904 (CA, MBG); Buenos Aires, Bahia Blanca, Oct.-Nov. 1903, *Ameghino* (MBG); Cordoba, Dec. 3, 1902, *Stuckert* 12172 (D); Altos Cementerio, Cordoba, Nov. 30, 1897, *Stuckert* 4007 (D).

As Miers pointed out, *L. chilense* is typical of a huge aggregate of forms characterized by stellate pubescence, with a pubescent ring near base of the corolla-tube, exteriorly, and with glandular, enlarged filament bases. The group is an extremely variable one, the leaves and pubescence especially showing an unusual amount of variation. In working with the material of this and other closely related "species" the writer combined a number of species and varieties under the one name. The different species that have been described have been set off on leaf characters chiefly,—organs which are too variable in the genus, and in this species in particular, to be of much taxonomic worth. It is possible to trace a gradual series from linear to narrowly oblong leaves in plants from any one locality, and indeed, sometimes on the same plant.

There are certain tendencies within the species, however, that are of interest. The following plants from southern Argentina ("Patagonia") have narrow leaves and smaller flowers than usual, the leaves ranging from 0.5 to 2 mm. broad, and 5 to 20 mm. long, the corollas being from 5 to 9 mm. long, and the calyx 1.5 to 3 mm. long; *L. filifolium* and *L. patagonicum* belong to this group.

CHILE: Peñaflor Cerro, near Santiago, Oct. 1923, *Montero* 74 (G).

ARGENTINA: Carmensa, Prov. Mendoza, Nov. 5, 1928, *Parodi* 8583 (G); Renca, San Luis, Nov. 19, 1925, *Castellanos* (MBG);

Cordoba de la Rioja, coll. of 1873, *Lorentz & Hieronymus* (NY); El Jaquel, Cordillera de la Rioja, March 3, 1879, *Hieronymus & Niederlein* 345 (D); Bahia Blanca, Prov. Cordoba?, coll. of 1837, *J. Tweedie* (KEW); south of Prov. Buenos Aires, "Patagonia," *J. Tweedie* (KEW); south of Province of Buenos Aires, *J. Tweedie* (KEW TYPE collection of *L. filifolium* var. *minutifolium*); Monte del Loro, pampas of Buenos Aires, *Gillies* (KEW); Bahia Blanca, coast of Patagonia, early in Oct. 1832, *Darwin* 509 (KEW TYPE collection of *L. filifolium*); head of Rio Negro, Nov. 1891, *Andrews* 17 (KEW); Puerto Madryn, Terr. Chubut, Apr., 1914, *Hauman* (MBG); Travesia de Rawson à la Cordillera, Prov. Chubut, Nov. 1-30, 1903, *Illin* 187 (C); Rio Negro, coll. of 1838-42, *Wilkes Expl. Exped.* (G, US); Patagonia, lat. 50° 30' S, coll. of 1882-84, *Moreno & Tonini* 527 (NY); without locality, *Capt. Middleton* (KEW); Pampas, 34° W, Jan. 1892, *Kuntze* (NY, US); Argentine Republic, Sept. 1872, *Jameson* (KEW).

*Lycium gracile* has leaves much like the preceding group, the leaves being 1.5-2.5 mm. broad, the corolla 6-8 mm. long, and the calyx 1.5-3 mm. long. This group is exemplified by the following collections:

CHILE: Coquimbo, coll. of 1888, *Philippi* (KEW, US); Iter Mendocinum, Cordillera de Chile, coll. of 1868-69, *Philippi* (D); Atacama, Sept.-Oct. 1890, *Morong* 1116 (F, MBG, NY, PA, US); Copiapo, Prov. Atacama, Quebrada de Chauchouquin, Sept. 1885, *Gigoux* (G); vicinity of Copiapo, coll. of 1922, *Gigoux* (G); vicinity of Copiapo, Nov. 16, 1925, alt. 370 m., *Johnston* 4989 (G).

ARGENTINA: Andes, 38° 41' S, Aug. 24, 1925, alt. 250-300 m., *Comber* 28 (KEW).

The type of *L. scoparium* is very much like that of *L. chilense*, but some of Miers' varieties under the former species have leaves 3-7 mm. broad; in this group the pubescence is very frequently unbranched. The following collections are of this nature:

CHILE: Valparaiso, Fesen in der Nähe des Meeres, Dec. 15, 1895, *Buchtien* (ST, US); Valparaiso, coll. of 1856-57, *Germain* (D, KEW); Punta, March, 1923, *Claude-Joseph* 2149 (US); Santiago, coll. of 1888, *Philippi* (US); Santiago, *Philippi* 583 (D); Limache (Quinta Garaventa), *Looser* 968 (G); Prov. Aconcagua, *Philippi* (V).

ARGENTINA: Mendoza, *Gillies* (KEW TYPE collection of *L. scorpiarium* var. *affine*); Puente del Inca, Prov. Mendoza, Jan. 1908, *Hauman*, and Feb. 1926, *Yepes* (MBG); Puenta del Inca, in viciniis montis Aconcagua, Prov. Mendoza, March 3, 1903, *Malme* 2873 (ST); Santa Rosa de Los Andes to Uspallata, Prov. Mendoza, June 1876, *Moseley* (KEW); Prov. Mendoza, *Gillies* (KEW TYPE collection of *L. scorpiarium* var. *confertifolium*); Arroyo Frias, prope Rosario, Prov. Santa Fe, Oct. 6, 1929, *Cabrera* 920 (G); hedges near Sachal, Prov. San Juan, Sept. 1871 and 1872, *Jameson* (KEW, V); Cordoba, Oct. 18, 1870, *Hieronymus* (NY); bei Cacapiohe in der Nähe der Mina Argentina, Prov. Cordoba, Dept. las Minas, March 19-20, 1877, *Hieronymus* (F); Cordoba, Nov. 1875, *Hieronymus* (KEW); Cordoba, Nov. 1875, *Hieronymus* 494 (F, US); Cordoba, Barrancas, coll. of 1875-76, *Hieronymus* (F, US); San Javier, Prov. Cordoba, Dec. 1922, *Hauman* (MBG); Tucuman, *J. Tweedie* (KEW TYPE collection of *L. Grevilleanum*); Campana, Buenos Aires, Oct. 27, 1928, *Parodi* 8601 (G).

*Lycium chilense* can readily be told from *L. ciliatum* because of the narrower, entire leaves, and the much shorter calyx-lobes.

42. *L. Vergarae* Philippi, Anal. Mus. Nac. Chil. Bot. (Cat. Pl. Itin. Tarapaca) 8: 67. 1891; I. M. Johnst. Physis 9: 319. 1929.

Pl. 19, figs. 16-18.

*L. chilense* subsp. *normale* var. *Vergarae* (Philippi) Reiche, Anal. Univ. Chil. 123: 394. 1908, and Fl. Chil. 5: 314. 1910.

A much-branched, spreading, prostrate or ascending, armed, pubescent shrub 1-2 dm. tall, pubescence short, somewhat hirtellous and branched; branches slender, armed only with pungent tips of slender branchlets, tan, striate; leaves 3-7 in a fascicle, linear to narrowly oblong-ovate, 4-10 mm. long, 1-2 mm. broad, rounded or acute, tapering to a petiole-like base, densely pubescent; flowers few, borne singly at the nodes, the pedicels 2-4 mm. long; calyx campanulate, 2.5-4 mm. long, densely pubescent, lobes 5, oblong-triangular, nearly or quite equal to tube; corolla greenish yellow, tubular portion broadly tubular-infundibuliform, 2.5-3.5 mm. long, 2 mm. in diameter at the base, but little more at the summit, rather thickly pubescent exteriorly, with a

dense ring of pubescence about 1 mm. above the base, lobes 5, oblong-ovate, spreading, 3-4 mm. long, their margins and outer surfaces thickly beset with branched hairs; stamens exserted 2-3 mm., filaments subequal, adnate for about half the length of the corolla-tube or slightly above, enlarged and glandular at the base of the free portion, its margins densely ciliate with long, much-branched, interlacing hairs, adjacent corolla-tube with a tuft of pubescence between the stamen bases; style somewhat longer than stamens, usually equal to or slightly longer than corolla-lobes; berry ovoid, 5-6 mm. in thickness, red when ripe, many-seeded.

Type: Calalaste, Terr. Los Andes, Argentina, alt. 3700 m., *Philippi* (Museo Nacional, Santiago, Chile).

Distribution: Terr. of Los Andes, Argentina, and adjacent Chile, apparently growing at rather high altitudes.

Material seen:

ARGENTINA: vicinity of Baños San Crispin, about lat. 29° 11' S, long. 69° 44' W, Jan. 10-12, 1926, alt. 3300 m., *Johnston* 6121 (G).

CHILE:

TARAPACÁ: N. Chile, Feb. 1888, *Philippi* (KEW), probably TYPE collection, in which case, the locality is more apt to be Argentina.

*Lycium Vergarae* is much like *L. chilense* in most respects and may be but a dwarf variety of that species; however, since it differs in its dwarf, spreading habit, shorter, more tubular corolla, and more densely hairy stamens, the writer believes it specifically distinct.

43. *L. ciliatum* Schlecht. *Linnaea* 7: 69. 1832; *Walp. Rep. Bot. Syst.* 3: 107. 1844; *Mart. Fl. Bras.* 10: 153. 1846; *Dunal in DC. Prodr.* 13<sup>1</sup>: 508. 1852; *Griseb. Abhandl. König. Ges. Wiss. Gött.* 19: 216. 1874 (*Pl. Lorent.* 168. 1874), and 24: 246 (*Symb. Fl. Arg.*). 1879. Pl. 19, figs. 7-9.

*L. floribundum* γ *ciliatum* (Schlecht.) *Terrac. Malpighia* 4: 532. 1891.

*L. floribundum* γ *ciliatum* var. *Grisebachii* *Terrac. l. c.*

*L. erosum* Miers, *Ann. & Mag. Nat. Hist.* II, 14: 343. 1854, and *Ill. S. Amer. Pl.* 2: 136, *pl. 744.* 1857.

*L. argentinum* Hieron. Bol. Acad. Cienc. Cord. 2: 39, pl. 2, figs. 9-11. 1876.

*L. scoparium* var. *argentinum* (Hieron.) Griseb. l. c.

*L. scoparium*  $\beta$  *argentinum* (Hieron.) Terrac. l. c. 533.

*L. venosum* Philippi, Anal. Univ. Chil. 91: 22. 1895, judging from description.

*Salpichroa ciliata* Miers, Hook. Lond. Jour. Bot. 4: 329. 1845; Ann. & Mag. Nat. Hist. II, 14: 345. 1854, and Ill. S. Amer. Pl. 2: 138. 1857.

A rather sparingly branched shrub 1-2.5 m. tall; branches slender, somewhat flexuous, hirtellous or, less commonly, puberulent or glabrate, straw-colored; leaves rather broadly ovate to lanceolate, nearly glabrous, or with few simple or forked, stiff, short hairs, blade usually somewhat rounded, 1.5-4 cm. long, 0.5-2.5 cm. broad, margins remotely denticulate or nearly entire (3-lobed in one specimen), usually ciliate, borne singly at the nodes, with petiole 1-3 mm. long; flowers 1-4 at the nodes, pedicels 3-20 mm. long, commonly rather densely glandular-ciliate; calyx campanulate, hirsutulous, tubular portion about 2 mm. long and as much in diameter, lobes 5, linear-lanceolate, much acuminate, 2-6 mm. long, frequently increasing in length with growth of ovary; corolla-tube campanulate, 3-4 mm. long, about 3 mm. in diameter at top, rather densely hairy on the outer surface, about 1 mm. above the base, lobes 5, oblong-oval, spreading, 5 mm. long and half as broad, pubescent on exterior surface, ciliate; stamens 5, subequal, about equalling corolla-lobes, thus much exserted when lobes are spreading, filaments adnate about  $\frac{1}{3}$  the length of the corolla-tube, with enlarged, glandular, fringed base, corolla-tube with tuft of hairs between filament bases, anthers 1.25 mm. long; style equalling or exceeding stamens 1 or 2 mm.; berry red, ovoid, 5-6 mm. long, 20-60-seeded.

Type: "in Brasilia meridionali ad fluvium Rio Negro," Sellow (Berlin).

Distribution: central and northern Argentina, from Buenos Aires northward to Bolivia.

Material seen:

BRAZIL: without locality, Sellow d1012 (G photograph of TYPE); without locality, Sellow (KEW, probably TYPE collection).

BOLIVIA: Cochabamba, March, 1892, alt. 800 m., *Kuntze* (F, NY).

ARGENTINA: without locality, June 1906, *Gandoger* (MBG); Ambil, Apr. 4, 1908, *Stuckert 18781* (D); Los Hornillos, Prov. Rioja, March 8, 1879, *Hieronymus & Niederlein 179* (D); Quinta, pr. Laguna de la Brea in solo salso in dumetris, June 13, 1901, *Fries 173* (ST); Salta, Oct. 1892, *Kuntze* (NY); Salta, Nov. 1891, *Kuntze* (US); Tres Porteñas, Mendoza, Feb. 10, 1918, *Ruiz* (MBG); El Puesto, Catamarca, Jan. 23, 1930, *Castellanos* (MBG); Tucuman, coll. of 1836, *J. Tweedie* (KEW TYPE collection of *L. erosum*); Barranca colorado, Prov. Tucuman, Sept. 19, 1920, *Venturi* (MBG); Prov. Tucuman, Dept. Capital, Sept. 19, 1920, *Venturi 903* (US); Tapia, Tucuman, Dec. 18, 1911, *Rodriguez 550* (MBG); Chafiar Pozo, Tucuman, Aug. 1919, *Venturi 352* (MBG); Prov. Tucuman, Dept. Capital, Feb. 20, 1922, *Venturi 1681* (G, MBG); circa Capia, Prov. Tucuman, Dec. 1902, *Baer 111* (D); Pilcias, Prov. Catamarca, Oct. 1877, *Schickendantz 224* (D); Prov. Catamarca, Dept. Andalgala, Feb. 9, 1915, *Jörgensen 971* (C, G, MBG, US); Tintina, Santiago del Estero, March 8, 1917, *Hauman* (MBG); "El Charco," Prov. Santiago del Estero, Dept. Griminez, March 11, 1930, alt. 300 m., *Venturi 10407* (MBG, ST); Los Cocos, Capilla del Monte, Cordoba, Jan. 26, 1922, *Castellanos* (MBG); Cordoba, Dec. 22, 1876, *Hieronymus 113* (F, US); Salinas Grandes, Prov. Cordoba, Jan. 1916, *Hauman* (MBG); Cordoba, pr. urbem, Oct. 18, 1870, *Hieronymus* (D, NY); Cordoba, en la cercania de la ciudad, Oct. 18, 1870, *Hieronymus* (NY); Cordoba, Nov. 17, 1896, *Stuckert 109* (D); Cordoba, Sept.-Nov. 1876, *Hieronymus* (F); Puerto del Paraiso, Prov. Cordoba, Jan. 13, 1897, *Stuckert 1405* (D); Rio I, Cordoba, Feb. 25, 1897, *Stuckert 2224* (D); Cordoba, pr. urbem, Oct. 18, 1880, *Hieronymus* (KEW TYPE collection of *L. argentinum*); Sierra de Cordoba, Nov. 3, 1899, *Stuckert 7500* (D); Cordoba, Dec. 1891, *Kuntze* (F, NY, US); Altos Seco, Cordoba, Apr. 1898, *Stuckert 4513* (D); Prov. Cordoba, Dec. 24, *Lossen 304* (G, MBG); Cordoba, Nov. 1877, *Lorentz & Grisebach* (KEW); Cordoba, en las Quintas, Oct. 1883, *Galander* (NY); parks, gardens, and environs of city of Buenos Aires, June, 1913, *H. M. Curran 103* (US, in part); Rio Grande, Prov. Cordoba, coll. of 1837, *J. Tweedie* (KEW); Banda

Oriental, Prov. Cordoba?, coll. of 1837, *J. Tweedie* (KEW); Prov. San Luis, Nov. 14, 1925, *Castellanos* (MBG); Renca, Nov. 19, 1925, *Castellanos* (MBG), and Quebrada del Rio de Quines, Feb. 16, 1925, *Castellanos* (MBG).

Miers apparently had not seen the type of *L. ciliatum*, nor did he realize the true nature of the plant when he transferred the species to *Salpichroa*. The characters which he used to show that the species did not belong to *Lyctium* are, in reality, all common to that genus. In the same sentence he said "calyx split to the base into distinct, linear segments," and "berry encircled by the longer, enlarged calyx." In actuality, as shown in pl. 19, fig. 7, the calyx is not split to the base, but has a tube about 2 mm. long, —much the same as in *L. puberulum* and similar species. Due to the fact that he had a misconception of the plant, Miers described his *L. erosum* which is identical with *L. ciliatum*.

*Lyctium argentinum* is well within the range of variation of *L. ciliatum*, and cannot be maintained, even as a variety. *Lyctium venosum* is referred to this species with some hesitancy, since the type or any other material which can be regarded as authentic for the species has not been seen; however, the description makes it appear almost certain that Philippi had a plant which was the same as Schlechtendahl's *L. ciliatum*.

### Section III. SCLEROCARPELLUM C. L. Hitchcock

#### Section SCLEROCARPELLUM C. L. Hitchcock, sect. nov.

Fruit of two 1-seeded carpels, pericarp much hardened. Filaments not enlarged and glandular at base.

#### KEY TO SPECIES

- A. North American species; lobes of corolla nearly equal to tube. .... 45. *L. californicum*
- AA. South American species; lobes of corolla  $\frac{1}{4}$ — $\frac{1}{2}$  the length of the tube. .... 44. *L. Ameghinoi*

44. *L. Ameghinoi* Speg. Rev. Fac. Agr. y Vet. La Plata (Pl. Patag. Austr.) 3: 553. 1897. Pl. 18, figs. 16-18.

*Grabowskia Ameghinoi* Speg. Anal. Soc. Cient. Arg. (Nov. Add. Fl. Patag.) 53: 168. 1902.

*L. durispina* Dusén, Svensk. Exped. Magell. 3: 251, pl. 9, fig. 3, pl. 12, fig. 2. 1900.

A heavy, rigid, spreading shrub; branches and branchlets thick, stout, ending in blunt spines, yellow-gray to dark gray, puberulent when very young, much corrugated and glabrous with age; leaves spatulate or oblanceolate, fleshy, terete or flattened, 3-10 mm. long, 1-1.5 mm. broad, glabrous or very minutely pubescent, 1-6 in a fascicle, from rather conspicuously swollen nodes, these very closely approximated (1-4 mm. apart); flowers 1-4 in a fascicle, on glabrous pedicels 1-2 mm. long; calyx tubular, 3-3.5 mm. long, about 2 mm. in diameter, glabrous or with few hairs on the margins of the lobes, lobes 4, very short, not over  $\frac{1}{4}$  length of tube; corolla tubular, the tube 5-6 mm. long, 2 mm. in diameter at summit, glabrous without, lobes 4, recurved, rounded-cuneate, about 1 mm. long; stamens 4, slightly exserted from tube, filaments unequal, longest about equaling corolla-tube, adnate about  $\frac{1}{3}$  the length of the corolla-tube, pilose for 1 mm. above the adnate portion, corolla-tube somewhat pubescent immediately below this point; style approximately equaling stamens, or shorter; fruit of 2 carpels with much-hardened pericarp, one large seed in each carpel.

Type: in valleculis siccis glareosis prope Golfo de San Jorge, Feb. 1896, Sr. Carlos Ameghino (Spegazzini Herbarium).

Distribution: southern Argentina, from Terr. Rio Negro to Terr. Santa Cruz.

Material seen:

ARGENTINA: Terr. Santa Cruz, Nov. 19, 1928, alt. 250 m., *Donat* 37 (MBG); Terr. Chubut, Meseta de Espinoza, Nov. 1929, *Ferruglio* (MBG); Rio Corcovado, Chubut, Feb. 1903, *Illin* (MBG); Camarones, Patagonia, Terr. Chubut, coll. of 1912, *Aurelius*, in part (ST); Peninsula Valdez, playa punta norte, July 20, 1912, *Exp. Roveretto* (MBG); Travesia de Rawson à la Cordillera Argentina, Terr. Chubut, Nov. 1-30, 1903, *Illin* 73 (C); vicinity of General Roca, Terr. Rio Negro, Oct. 1914-Feb. 1915, alt. 250-360 m., *Fischer* 132 (MBG); alrededores de Valcheta, Terr. Rio Negro, Nov. 22, 1928, *Castellanos* (MBG).

Spegazzini transferred his species to *Grabowskia*, because of the fruit characters. However, it, as well as *L. californicum*, is much more like the other species of *Lycium* in all respects except the nature of the fruit, and, as shown in the discussion under "Mor-

phology," even the type of fruit is more closely approached by *L. macrodon* than by any species of *Grabowskia*.

45. *L. californicum* Nutt. ex Gray, Bot. Calif. 1: 542. 1876, and Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 238, 437. 1886; Abrams, Fl. Los Angeles & Vic. 323. 1917; David. & Moxl. Fl. S. Calif. 321. 1923; I. M. Johnst. Proc. Calif. Acad. Sci. IV, 12: 1155. 1924; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1288. 1924; Jepson, Man. Fl. Pl. Calif. 890. 1925.

Pl. 12, figs. 4-6; pl. 13, figs. 11-15; pl. 19, figs. 1-3.

*L. carolinianum* γ *californicum* Terrac. Malpighia 4: 518. 1891.

*L. californicum* var. *arizonicum* Gray, Syn. Fl. N. Amer. ed. 2, 2<sup>1</sup>: 437. 1886.

*L. carolinianum* γ *californicum* var. *arizonicum* (Gray) Terrac. l. c. 519.

*L. carinatum* Wats. Proc. Amer. Acad. 24: 65. 1889; Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1287. 1924.

A densely branched, knotty, decumbent or spreading shrub 0.3-1.5 m. tall; branches very much intertwined, branchlets usually tipped with short, blunt spines, otherwise unarmed, bark yellowish to gray, glabrous to very minutely puberulent or sparsely scurfy; leaves linear-terete, ovoid, or spatuloid, succulent, 2-12 mm. (usually about 5) long, 1-3 mm. broad, sessile or with very short petiole, 1-3 in a fascicle, glabrous or somewhat pubescent; flowers borne singly, pedicels 1-4 mm. long; calyx campanulate, approximately 2.5 mm. long,  $\frac{1}{2}$  as great in diameter, usually 2-4-lobed, occasionally 5-lobed, lobes triangular, about  $\frac{1}{3}$  as long as the tube, usually ciliolate, rest of calyx puberulent; corolla white to light purple, tube 2-3 mm. long, about 2 mm. in diameter, lobes 4, oblong-ovate, about equal to tube, spreading or reflexed, remotely ciliolate; stamens 4, scarcely equalling the corolla-lobes, but exserted, filaments about equal, adnate to slightly above the middle of the corolla-tube, their free base and adjacent corolla-tube densely hairy, but no pubescence below free portion, anthers less than 1 mm. long; style usually exceeding corolla by 1-2 mm.; fruit ovoid, 2-4 mm. long, pericarp much hardened, carpels separating rather readily at maturity, each carpel 1-seeded.

Type: San Diego, U. California, *Nuttall* (G).

Distribution: western Arizona and southern California, mainly along the coast, southward along the coast of Baja California, and at Guaymas, Sonora, Mexico.

Material seen:

UNITED STATES OF AMERICA

ARIZONA: Lowell, Cochise Co., May, 1884, *W. F. Parish* 179 (G, US); near Sierra Estrella, Pinal Co., Feb. 25, 1927, *Peebles & Harrison* 3546 (US); Santa Cruz Wash, near Casa Grande, Pinal Co., March 24, 1931, *Peebles & King* 7508 (SAC); Santa Cruz Wash, Casa Grande, Feb. 17, 1931, *Peebles* 7489 (SAC); Maricopa, May, 1885, *A. Gray*, TYPE of *L. californicum* var. *arizonicum* (G); near Casa Grande, March 20, 1930, *Peebles & Harrison* 6464 (US); Santa Cruz Wash, near Casa Grande, Feb. 24, 1931, *Peebles & King* 7509 (P, SAC); near Casa Grande River, Dec. 24, 1900, *Griffiths* 2216 (NY); Santa Rosa to Casa Grande, March 13-Apr. 23, 1903, *Griffiths* 4052 (US); near Sacaton, Feb. 10, 1926, *H. F. Loomis* 698 (US).

CALIFORNIA: San Bernardino, May, 1882, *Lemmon* (C, D); Los Angeles, coll. of 1880, *Nevin* (G); seaside, Santa Monica, March, 1881, *Parry* 216 (G, MBG, NY); San Pedro, June 2, 1906, *Eastwood* 163 (CA); San Pedro Hills, near Rocky Point, March 14, 1903, *Abrams* 3131 (D, F, G, MBG, NY, P, PA, S, US); Pt. Firmin, San Pedro, Apr. 24, 1912, alt. 60 m., *H. H. Smith* 4825 (F); Long Beach, Apr. 29, 1887, *B. H. Smith* (PA); borders of salt marshes, Wilmington, March 31, 1882, *Pringle* (CA, F, G, PA, US); Orange Co., fall of 1902, *Geis* (S); Balboa, mainland, near bridge, Feb. 10, 1924, *Peirson* 4526 (S); Laguna Beach, fall of 1902, *Geis* 581 (P, S); Laguna Beach, May 5, 1918, *Johnston* 1949 (C, P); Laguna Beach, clay bluffs near shore, May 5, 1916, *Crawford* (P); shore bluffs, Laguna, July 24, 1916, *Crawford* 741 (C, P); Laguna, bluffs overhanging sea, May 5, 1918, *Munz* 2196 (P); Catalina Is., March, 1900, *Trask* 499 (F); Santa Catalina Is., Jan. 21, 1920, *Millsbaugh* 4612 (F); Avalon, Santa Catalina Is., March, 1896, *Trask* (MBG); Avalon, Santa Catalina Is., March, 1900, *Trask* (NY); Isthmus, Santa Catalina Is., Apr. 21-26, 1904, *Grant & Wheeler* H2447 (S); Isthmus, Santa Catalina Is., *Knopf* 419 (F); The Isthmus, Santa Catalina Is., June 10, 1918, *Mrs. C.*

*E. Miller* (CA); Isthmus Cove, Santa Catalina Is., March 14, 1920, *Millspaugh* 4778 (F); Isthmus, Santa Catalina Is., May 23, 1829, *L. W. Nuttall* 258, surely wrong date (F); Pacific slope of Salta Verde, Santa Catalina Is., *Knopf* 332 (F); San Clemente Is., March 25, 1918, *Evermann* (CA); San Clemente Is., in heavy soil, Apr. 9, 1923, *Munz* 6648 (P); San Clemente Is., Oct. 1902, *Trask* 27 (US); San Nicholas Is., Apr. 1897, *Trask* (CA, MBG, US); arroyo cliffs, San Nicholas Is., May, 1901, *Trask* 60 (G); La Jolla, San Diego Co., Nov. 24, 1919, *Millspaugh* 4450 (F); La Jolla, Nov. 6, 1894, *Snyder* (F); La Jolla, prope San Diego, July, 1919, *Spencer* (MBG); San Diego Co., March 26, 1921, *M. L. Campbell* 136 (CA); La Costa, Apr. 1896, *Alderson* 1190 (S); river-bank, Del Mar, March 24, 1895, *Angier* 14 (MBG); in beach sand, Ocean Beach, San Diego Co., Feb. 28, 1917, *Spencer* 266 (G, NY, P); San Diego, June 5, 1895, *Alderson* 1001 (S); San Diego, Sept. 3, 1904, *Berg* (C); San Diego, Apr. 4, 1903, *T. S. Brandegee* (C); San Diego, coll. of 1875, *Cleveland* (G); San Diego, Sept. 1878, *Cleveland* (MBG); San Diego, coll. of 1882, *Cleveland* (S); San Diego, May, 1884, *Cleveland* (C); San Diego, July, 1902, *Herre* (S); San Diego, Aug. 8, 1902, *Herre* (P, S); San Diego, March 9, 1882, *Jones* 3045 (CA, NY, P, US in part); San Diego, U. Cal., *T. Nuttall* (G TYPE); San Diego, Feb. 28, 1884, *Orcutt* (MBG); San Diego, coll. of 1875, *Palmer* 262 (F, MBG, NY); plains south of San Diego, Nov. 3, 1880, *G. Engelmann* (MBG); canyon, Balboa Park, San Diego, Apr. 29, 1924, *Spencer* 2394 (G); on slope of clay hill, San Diego, March 13, 1862, *Cooper* 468 (G, US); Point Loma, San Diego Co., Feb. 5, 1894, *Sheldon* 38 (US); San Diego Coast, Apr. 1903, *Hall* 3959 (C); seashore, San Diego, Dec. 1896, *Setchell* (C); Oceanside, San Diego, Apr. 1893, *King* (C); North Coronado, San Diego Co., Apr. 7, 1913, *Eastwood* (CA); Coronado Beach, Apr. 7, 1902, *Grant* (S); North Island, Spanish Bight shore, San Diego, Dec. 27, 1908, *Dudley* (S); south part of San Diego Co., coll. of 1875, *Palmer* (G); Monument, Mexican Boundary, Oct. 10, 1875, *Palmer* 146 (C, US).

#### MEXICO

BAJA CALIFORNIA: ranch, 29 miles southwest of Tia Juana, Apr. 13, 1925, *Jones* (P); Todos Santos Island, March–June, 1897, *Anthony* 211 (C, G, MBG, S, US); Guadalupe Is., coll. of 1875,

*Palmer* 63 (G, MBG, NY, PA); Abreojos Point, March 16, 1911, *Rose* 16253 (US); Natividad Is., Apr. 10, 1897, *T. S. Brandegee* (C); mainland near Ascension Island, Apr. 4, 1897, *T. S. Brandegee* (C); Playa Maria, Aug. 23, 1896, *Anthony* 146 (C); San Benito Is., March 27, 1897, *T. S. Brandegee* (P); San Benito Is., March 28, 1897, *T. S. Brandegee* (C); San Benito Is., coll. of 1889, *Palmer* 916 (G, US); San Benito Is., March 9, 1911, *Rose* 16057 (NY, US); San Benito Is., March 9, 1911, *Rose* 16065 (US); San Benito Is., March 9, 1911, *Rose* 16076 (NY, US).

SONORA: Guaymas, coll. of 1887, *Palmer* 178, TYPE collection of *L. carinatum* (G TYPE, C, NY, US, "L. Angeles Bay" is also written on the US sheet).

WITHOUT LOCALITY: *Parry*, coll. of 1882 (MBG).

*Lycium carinatum* and the variety *arizonicum* cannot be maintained as they are identical with coastal material of *L. californicum*. The second number which Gray cited under *L. californicum* var. *arizonicum*, from Lowell, Arizona, collected by Parish, has leaves 6 mm. long and 2 mm. broad,—even the leaves of the type, which are not over 3 mm. long, are not unusual for either Arizona or coastal plants.

#### DOUBTFUL AND EXCLUDED SPECIES

*Lycium acnistoides* Griseb. Cat. Pl. Cub. 188. 1866 = *Acnistus* sp.? The material seen, Cuba, *Wright* 3033 (G TYPE, MBG), apparently has induplicate aestivation, and is otherwise more similar to *Acnistus* than to *Lycium*.

*L. aggregatum* Ruiz & Pavon, Fl. Peruv. 2: 45, pl. 182, fig. a. 1799 = *Acnistus aggregatus* (Ruiz & Pavon) Miers, Hook. Lond. Jour. Bot. 4: 341. 1845 = *Dunalia campanulata* (Lam.) Macbride, Field Mus. Pub. Bot. 8: 107. 1930.

*L. americanum* Jacq. Stirp. Amer. Hist. 65. 1788. Identity uncertain; the original description gives the corolla-length as "pollicaris," a length much in excess of that of any species of *Lycium* seen from the West Indies.

*L. arborescens* Sprengel, Syst. Veg. 1: 701. 1825 = *Acnistus aggregatus* (Ruiz & Pavon) Miers. The description of the plant is very meagre, but shows plainly that the species belongs to *Acnistus* rather than to *Lycium*.

*L. boerhaviaefolium* Linn. f. Suppl. 150. 1781 = *Grabowskia boerhaviaefolia* Schlecht. *Linnaea* 7: 72. 1832; Lindley, *Bot. Reg.* 23: 1985. 1837.

*L. brachyanthum* Gray ex Hemsl. *Biol. Cent.-Am. Bot.* 2: 426. 1882 = *Citharexylum brachyanthum* Gray, *Syn. Fl. N. Amer.* ed. 2, 2<sup>1</sup>: 458. 1886. Pl. 13, figs. 7-10; pl. 19, figs. 22-24.

*L. brevipes* Benth. *Bot. Voy. Sulph.* 40. 1844. Identity uncertain, very probably the same as *L. Richii* Gray, but evidence does not warrant an unqualified reduction. See discussion under *L. Richii*.

*L. capillare* Miers, *Ann. & Mag. Nat. Hist.* II, 14: 188. 1854, and *Ill. S. Amer. Pl.* 2: 123, *pl. 70E*. 1857. Although no material has been seen which could be referred to this species, the writer feels that it is very probably a valid species.

*L. capsulare* Linn. *Cent. Pl.* 2: 11. 1756; *Amoen. Acad.* 4: 308. 1759 = *Hydrolea elegans* A. W. Benn. *Jour. Linn. Soc. Bot.* 11: 271. 1871. Linnaeus' description is not adequate to base a conclusion as to the true status of this species, but it seems certain that it is not a *Lycium*.

*L. Chanar* Philippi, *Anal. Mus. Nac. Chil. Bot. (Cat. Pl. Itin. Tarapaca)* 8: 68. 1891 = *L. crassispina* Philippi, according to Reiche, *Fl. Chil.* 5: 317. 1910. However, the original description gives the length of the corolla as 5.5-6 mm., which would preclude such a possibility. Identity uncertain.

*L. cornifolium* HBK. *Nov. Gen. et Sp. Pl.* 3: 54. 1818 = *Iochroma cornifolia* (HBK.) Miers, *Hook. Lond. Jour. Bot.* 7: 347. 1848.

*L. floribundum* HBK. *Nov. Gen. et Sp. Pl.* 3: 51. 1818 = *Acnistus*, probably *Ac. arborescens* Schlecht. *Linnaea* 7: 67. 1832.

*L. fuchsoides* Dunal in DC. *Prodr.* 13<sup>1</sup>: 603. 1852 = *Cestrum aurantiacum* Lindley, *Bot. Reg.* II, 7: misc. 71. 1844.

*L. fuchsoides* Humb. & Bonpl. *Pl. Aequin.* 1: 147, *pl. 42*. 1808; *Hook. Bot. Mag.* III, 1: 4149. 1845 = *Iochroma fuchsoides* (Humb. & Bonpl.) Miers, *Hook. Lond. Jour. Bot.* 7: 345. 1848.

*L. geniculatum* Fernald, *Proc. Amer. Acad.* 35: 566. 1900 = *Grabowskia geniculata* (Fernald) C. L. Hitchcock, *comb. nov.*

Pl. 13, figs. 2-5; pl. 19, figs. 19-21.

"Branches slender," flexuous, "geniculate," armed with slender

spines 1-1.5 cm. long, 1-2 cm. apart; branches pale yellow to reddish-gray, glabrous; leaf-blades ovate to ovate-oblong, 1.5-2.5 cm. long, 0.8-2 cm. broad, glabrous, glaucous, apex rounded to acute, base narrowed to a petiole 5-10 mm. long, leaves borne on small lateral branchlets, or congested at the nodes, but not truly fascicled; "flowers abundant in small cymes, terminating the rather crowded short ultimate branches," borne on pedicels about 1 cm. long; calyx very broadly campanulate, 2 mm. long, with 5 short subulate lobes about 1 mm. long; corolla obconic, glabrous without, 1.3 cm. long, the 5 lobes ovate, about  $\frac{2}{3}$  as long as tube; stamens 5, subequal, slightly longer than corolla-lobes, adnate for about 1.5 mm. from base of corolla-tube, filaments hairy to top of tube, adjacent corolla-tube also hairy, anthers about 1.5 mm. long and half as broad; style equalling stamens, stigma flat, round, slightly 2-lobed; ovary 4-celled, 4-ovuled; fruit 2-lobed, ovoid, 6-8 mm. thick, blue, glaucous, 2-carpellary, each carpel 2-celled, with one seed in each cell.

Type: near Tehuacan, Puebla, Mexico, Nov. 22, 1895, C. G. Pringle 7000 (G).

The large, non-fascicled leaves, the cymose inflorescence, and the 2-carpellary, 4-ovuled fruit place this plant definitely in the genus *Grabowskia* rather than in *Lycium*. This is apparently the first collection of *Grabowskia* in Mexico, the genus being primarily a South American one.

*L. gesnerioides* HBK. Nov. Gen. et Sp. Pl. 3: 53. 1818 = *Iochroma gesnerioides* (HBK.) Miers, Hook. Lond. Jour. Bot. 7: 346. 1848.

*L. glaucum* Philippi, Fl. Atac. 43. 1860 = *Grabowskia glauca* (Phil.) I. M. Johnst. Contr. Gray Herb. 85: 112. 1929.

*L. graciliflorum* U. Dammer, Meded. Rijks Herb. Leid. 29: 23. 1916. Identity uncertain, but judging from the original description and a photograph of the type collection at Berlin (G), the species is very close to *L. Morongii* Britton.

*L. grandifolium* Willd. ex Roem. & Schult. Syst. Veg. 4: 698. 1819, is surely an *Aenistus*, and possibly conspecific with *Ac. grandiflorus* Miers, Hook. Lond. Jour. Bot. 4: 344. 1845.

*L. guayaquilense* HBK. Nov. Gen. et Sp. Pl. 3: 50. 1818 = *Aenistus guayaquilensis* (HBK.) G. Don, Gen. Hist. Dichl. Pl. 4: 461. 1838.

*L. halophilum* Speg. Anal. Soc. Cient. Argent. (Nov. Add. Fl. Patag.) 53: 168. 1902. Since no material has been seen which can be referred to this species, the identity is uncertain; however, it is felt that Spegazzini's plant is close to *L. infaustum* Miers, but that it is probably a valid species, as are most of Spegazzini's species in this genus.

*L. Herzogii* U. Dammer, Meded. Rijks Herb. Leid. 29: 24. 1916. Judging from the description and a photograph of the type collection at Berlin (G), this plant is not a member of the genus *Lycium*, but its true identity is not known by the writer.

*L. heterophyllum* Murr. in Comm. Götting. 6: 6, pl. 2. 1785 = *Grabowskia*.

*L. horridum* HBK. Nov. Gen. et Sp. Pl. 3: 52. 1818, identity uncertain. Judging from the description and the plate of *L. obovatum* Ruiz & Pavon, Fl. Peruv. 2: 46, pl. 183, fig. c. 1799, the writer is inclined to believe that these two species are one and the same, and should be retained in the genus *Lycium*.

*L. ignarum* Miers, Ann. & Mag. Nat. Hist. II, 14: 194. 1854, and Ill. S. Amer. Pl. 2: 129, pl. 72A. 1857. Original locality unknown, but seemingly from South America, and conspecific with *L. ciliatum* Schlecht.

*L. loxense* HBK. Nov. Gen. et Sp. Pl. 3: 53. 1818 = *Iochroma loxense* (HBK.) Miers, Hook. Lond. Jour. Bot. 7: 347. 1848.

*L. macrophyllum* Benth. Pl. Hartw. 49. 1840 = *Acnistus macrophyllus* (Benth.) Standl. Contr. U. S. Nat. Herb. (Trees & Shrubs Mex.) 23: 1288. 1924.

*L. melanopotamicum* Niederlein in Roca, Exped. Rionegro 2: 261. 1881. No material has been seen which can be referred with certainty to this species. The description and a photograph of the type collection at Berlin (G) would indicate that the plant belongs to the *chilense* complex.

*L. Meyenianum* Nees, Nov. Act. Acad. Caes. Leop. 19, suppl. 1: 389. 1843, identity uncertain, but it seems not unlikely that the plant is a *Dunalia*, judging from the description which gives the corolla length as 15 lines.

*L. microphyllum* Willd. ex Roem. & Schult. Syst. Veg. 4: 698. 1819 = *L. parvifolium* R. & S. l. c.

*L. nanum* Philippi, Anal. Univ. Chil. 91: 25. 1895. Identity

uncertain, but if it is really a *Lycium* it is probably a valid species. Reiche, Fl. Chil. 5: 318. 1910, placed the plant under *Verbena uniflora* Phil.

*L. obovatum* Ruiz & Pavon, Fl. Peruv. 2: 46, pl. 183, fig. c. 1799 = *Dunalia obovata* (Ruiz & Pavon) U. Dammer in Engl. Bot. Jahrb. 50. Beibl. 111: 56. 1913, acc. Macbride, but see under *L. horridum* HBK, preceding.

*L. obtusum* Willd. ex Roem. & Schult. Syst. Veg. 4: 698. 1819, identity uncertain, but probably an *Acnistus*.

*L. ovale* Willd. ex Roem. & Schult. Syst. Veg. 4: 698. 1819. This plant, *L. ovatum* Willd., is placed in *Iochroma (Chaenesthes) cornifolia* by Miers, but the descriptions are too inadequate for the writer to draw any conclusion as to its generic status, other than that it is evidently not a species of *Lycium*.

*L. ovatum* Hort. Monsp. ex Dunal, DC. Prodr. 13<sup>1</sup>: 506. 1852 = *Fregirardia luteiflora* Dunal, l. c.

*L. ovatum* Willd. ex Dunal, DC. Prodr. 13<sup>1</sup>: 527. 1852 (see under *L. ovale* Willd.).

*L. parvifolium* Roem. & Schult. Syst. Veg. 4: 698. 1819. The diagnosis is too meagre to enable one to determine definitely the affinity of the species. Miers transferred it to *Lycioplesium (Acnistus)*.

*L. peruvianum* Hort. ex Dippel, Hand. Laubholze 1: 30. 1889 = *L. obovatum* Ruiz & Pavon.

*L. pruinosum* Griseb. Abhandl. König. Ges. Wiss. Gött. (Symb. Fl. Arg.) 24: 245. 1879 = *Grabowskia* sp.

*L. pulchellum* Mart. & Gal. Bull. Acad. Brux. 12<sup>1</sup>: 145. 1845. It has been impossible to locate this type; the description does not adequately portray the plant, but it is very strongly suspected that it may be a small-leaved plant of *L. pallidum* Miers. Miers transferred it to *Lycioplesium (Acnistus) pulchellum* Miers.

*Lycium quitense* Hook. Ic. Pl. 7: pl. 723. 1844 = *Poecilochroma quitenensis* Miers, Hook. Lond. Jour. Bot. 7: 368. 1848.

*L. rhadinum* Philippi, Anal. Univ. Chil. 91: 24. 1895, is probably some form of *L. chilense* Miers, but the description alone is not adequate to warrant a definite conclusion.

*L. salsum* Bartr. Trav. ed. 2, 57. 1792. The identity of this species cannot be ascertained, although other workers have as-

sumed that it is *L. carolinianum* Walt. The description is entirely inadequate to warrant any conclusion as to its true relationship; it could be either *L. carolinianum* Walt., or *L. halimifolium* Mill., the latter species being more "willow-leaved" than *L. carolinianum*. It is entirely possible that the plant was not even a *Lycium*.

*L. salsum* Ruiz & Pavon, Fl. Peruv. 2: 46, pl. 183, fig. a. 1799, is probably the same as *L. Tweedianum* Griseb., but possibly is *L. chilense* Miers.

*L. scabrum* Nees, Nov. Act. Acad. Caes. Leop. 19, suppl. 1: 389. 1843, is probably the same as *L. distichum* Meyen, from which species Nees segregated it.

*L. spathulatum* Ruiz & Pavon, Fl. Peruv. 2: 46, pl. 183, fig. b. 1799 = *Acnistus spathulatus* Ruiz & Pavon.

*L. spathulatum* Mathews ex Dunal, DC. Prodr. 13<sup>1</sup>: 484, 527. 1852 = *Dunalia acnistoides* Miers.

*L. Spencerae* Macbride, Contr. Gray Herb. N. S. 53: 18. 1918 = *Prunus fasciculatus* Gray. (see Munz & Johnst. Bull. Torr. Bot. Club 49: 356. 1922).

*L. stenophyllum* Remy in Gay, Hist. Chil. Bot. 5: 94. 1849, is possibly the same as *L. elongatum* Miers, but identity uncertain; may be same as *L. minutifolium* Remy.

*L. Tweedianum* Griseb. var. *heterophyllum* Hassler, Mus. Farm. Fac. Cien. Buenos Aires 21: 107. 1909. The type, *Rojas* 514, has not been seen, and the identity is not clear, but possibly some form of *L. Tweedianum*.

*L. umbellatum* Ruiz & Pavon, Fl. Peruv. 2: 45, pl. 182, fig. b. 1799 = *Acnistus umbellatus* (Ruiz & Pavon) Miers, Hook. Lond. Jour. Bot. 4: 342. 1845.

*L. umbrosum* HBK. Nov. Gen. et Sp. Pl. 3: 54. 1818 = *Io-chroma umbrosa* Miers, Hook. Lond. Jour. Bot. 7: 346. 1848.

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## EXPLANATION OF PLATE

## PLATE 12

Figs. 1-3. Photomicrographs of *Lycium macrodon* Gray, from Peebles 7484.

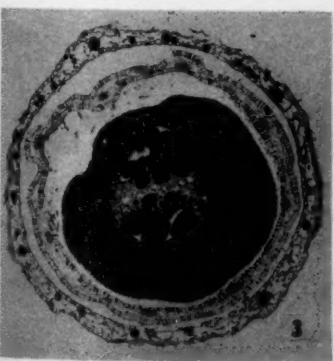
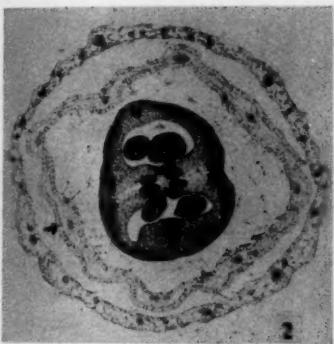
Figure 1 is a longitudinal section of a young ovary; the ovules in one carpel are shown. The upper part of the ovary, that which develops fertile seed, is shown on the right-hand side; below this the constriction is apparent, the pendulous ovules and thickened wall being notable. Figure 2 is a cross-section through the upper portion of the ovary, the vascular tissue of the ovary and the two ovules in each carpel being visible. The outer ring of tissue is the calyx; the middle ring is the corolla. Arrow marks the vascular trace of one filament; the pubescence on the corolla along this trace is discernible. Figure 3 is a cross-section through the lower portion or "disc" of the ovary; note the numerous ovules and thickened wall.

Figs. 4-6. Photomicrographs of *Lycium californicum* Nutt. ex Gray, from Peebles 7489 (SAC).

Figure 4 is a longitudinal section of a young ovary, the ovule in each carpel being apparent. The arrow indicates a filament as it is freed from the corolla-tube. An ovule is shown in fig. 5, also the vascular trace running to the funiculus. Arrow indicates region of micropyle. A cross-section of the ovary is shown in fig. 6, the vascular traces and one ovule in each carpel being visible.

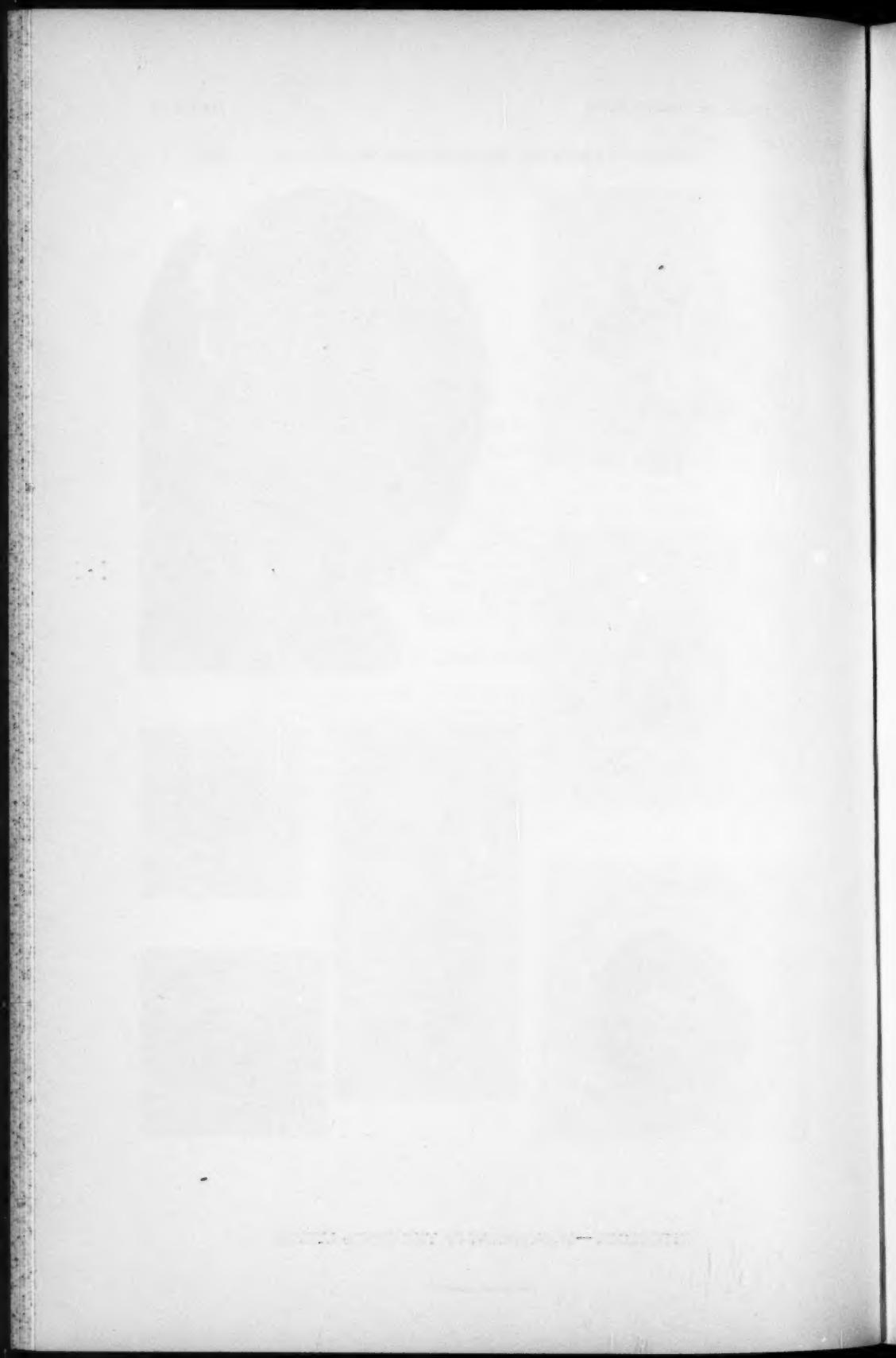
Fig. 7. Photomicrograph of *Lycium exsertum* Gray, from Peebles 7476.

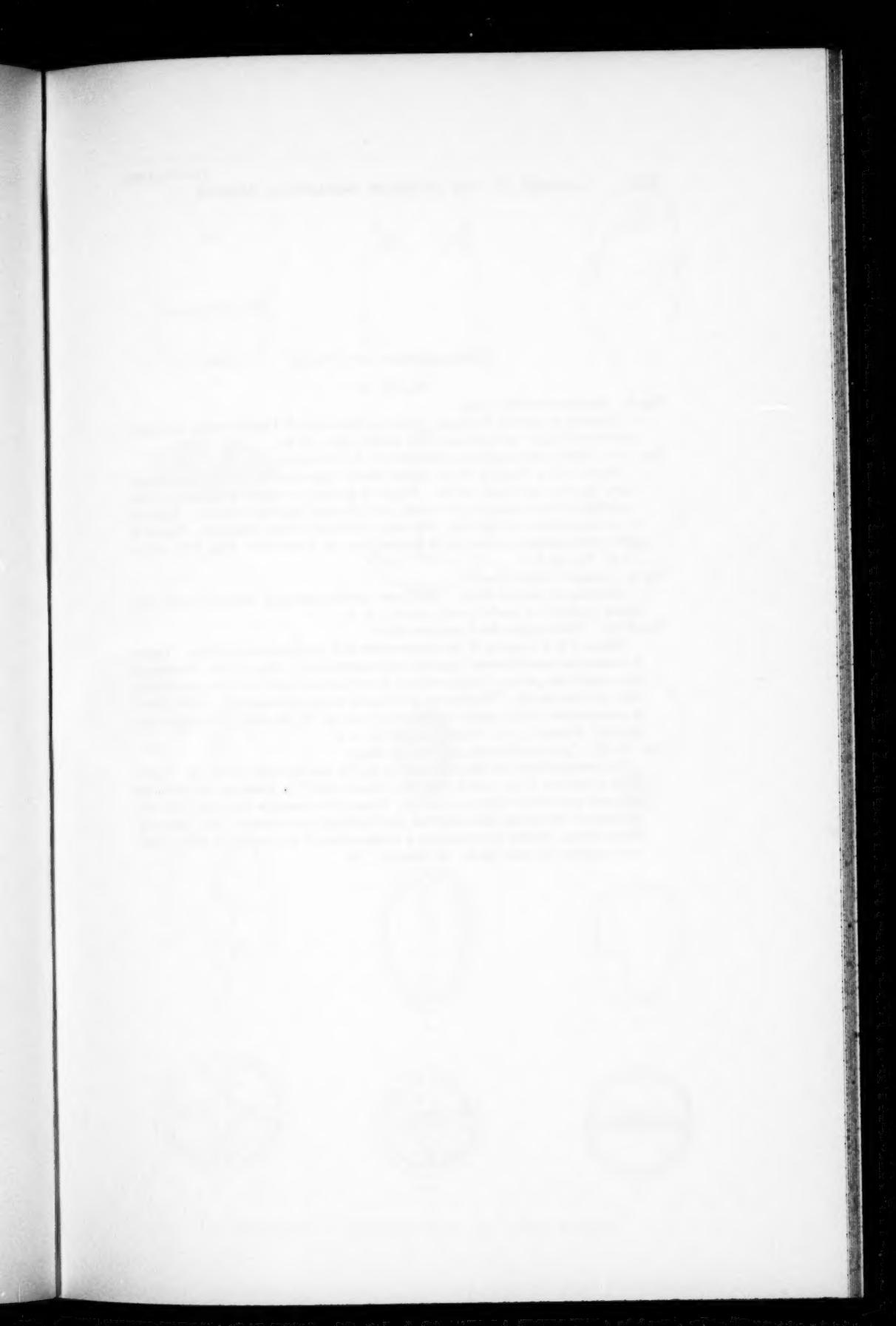
The axile placentation, numerous ovules, and vascular traces are discernible, as is the pubescence on the outside of the calyx.



HITCHCOCK—MONOGRAPH OF THE GENUS LYCIUM

COCKAYNE, BOSTON





## EXPLANATION OF PLATE

## PLATE 13

Fig. 1. *Lycium macrodon* Gray.

Drawing of mature fruit; the upper portion bears 2-4 fertile seeds, the lower portion or "disc" contains abortive ovules only.  $\times 4$ .

Figs. 2-5. *Grabowskia geniculata* (Fernald) C. L. Hitchcock.

Figure 3 is a drawing of one carpel shown from the ventral or commissural face; the two seeds are visible. Figure 4 shows one carpel with most of the commissural face removed, one ovule with its coiled embryo is shown. Figure 5 is a cross-section of the fruit, the stony endocarp being unshaded. Figure 2 shows the pericarp of one carpel viewed from the lower end. Figs. 2, 4, and 5,  $\times 4$ . Fig. 3,  $\times 5$ .

Fig. 6. *Lycium Cooperi* Gray.

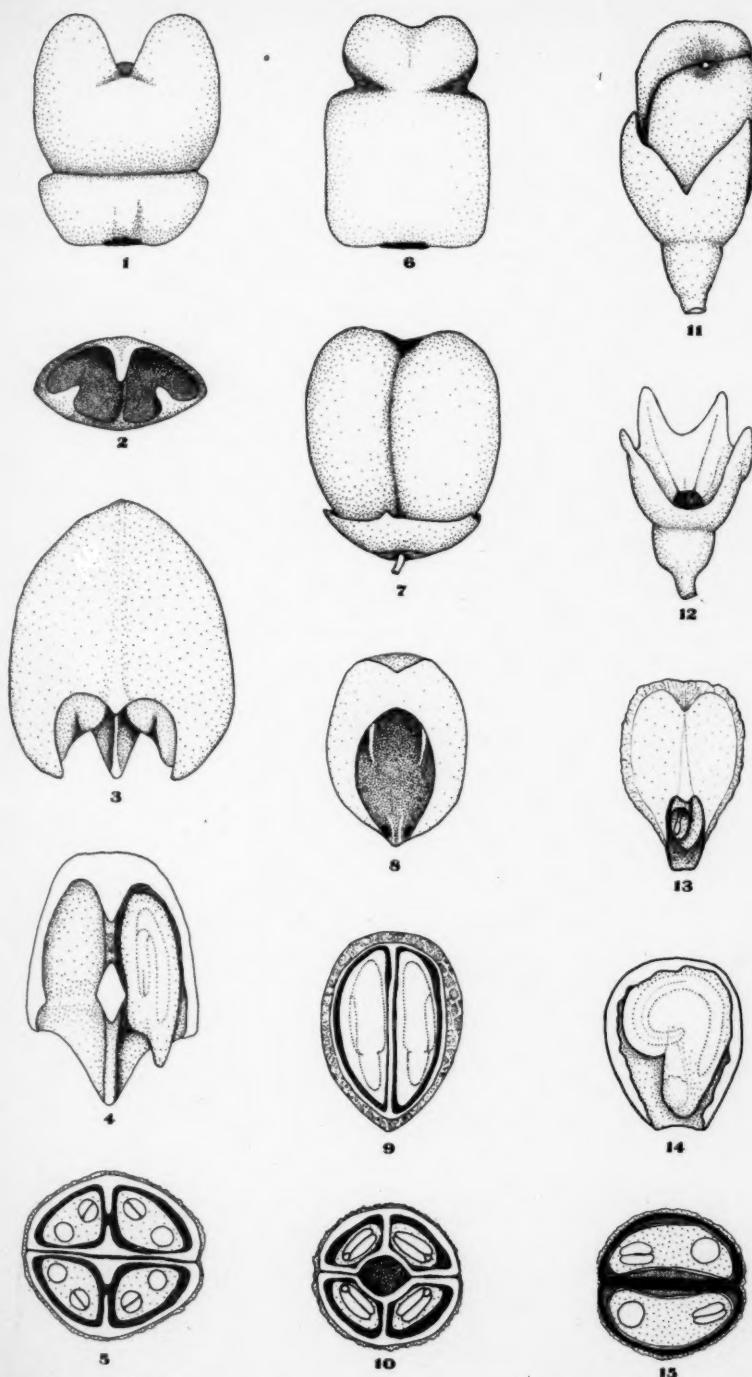
Drawing of mature fruit. The lower portion contains numerous seeds, the upper portion 1-2 seeds in each carpel.  $\times 4$ .

Figs. 7-10. *Citharexylum brachyanthum* Gray.

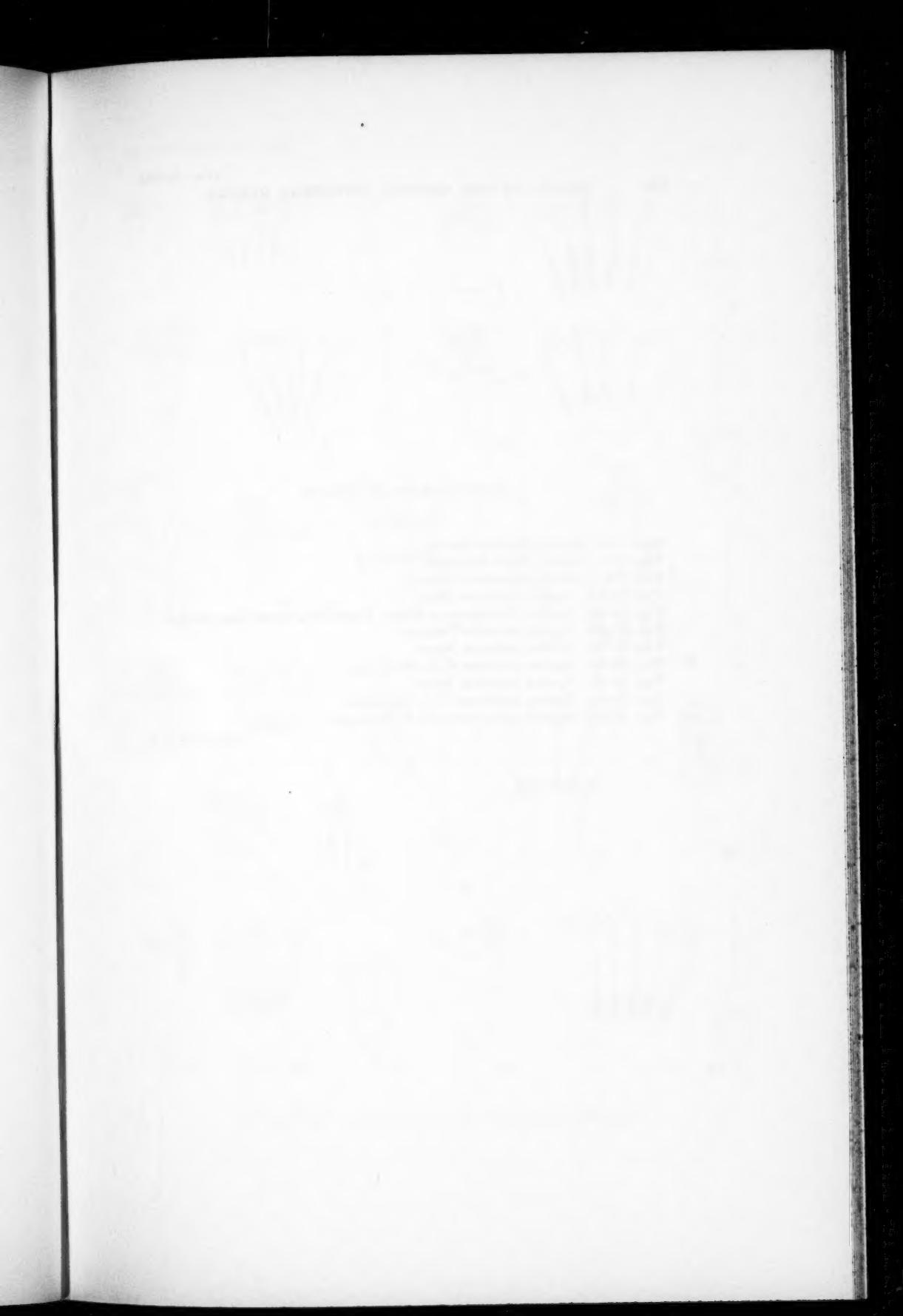
Figure 7 is a drawing of the mature fruit and much-expanded calyx. Figure 8 shows one carpel viewed from the commissural face. Figure 9 is a drawing of one carpel, the pericarp being removed from the dorsal side, showing the median wall and two seeds. The embryo is straight, being represented in dotted lines. A cross-section of the mature fruit is shown in fig. 10; the stony endocarp is unshaded. Figure 7,  $\times 5$ . Figs. 8, 9, and 10,  $\times 4$ .

Figs. 11-15. *Lycium californicum* Nutt. ex Gray.

The mature fruit and calyx is shown in fig. 11, and the calyx in fig. 12. Figure 13 is a drawing of one carpel with the commissural face showing; the funiculus and seed are visible within the carpel. Figure 14 represents one carpel with the pericarp of the dorsal side removed, the funiculus and embryo being shown in dotted lines. Figure 15 represents a cross-section of the fruit; the stony endocarp is shown in solid black. All figures  $\times 4$ .





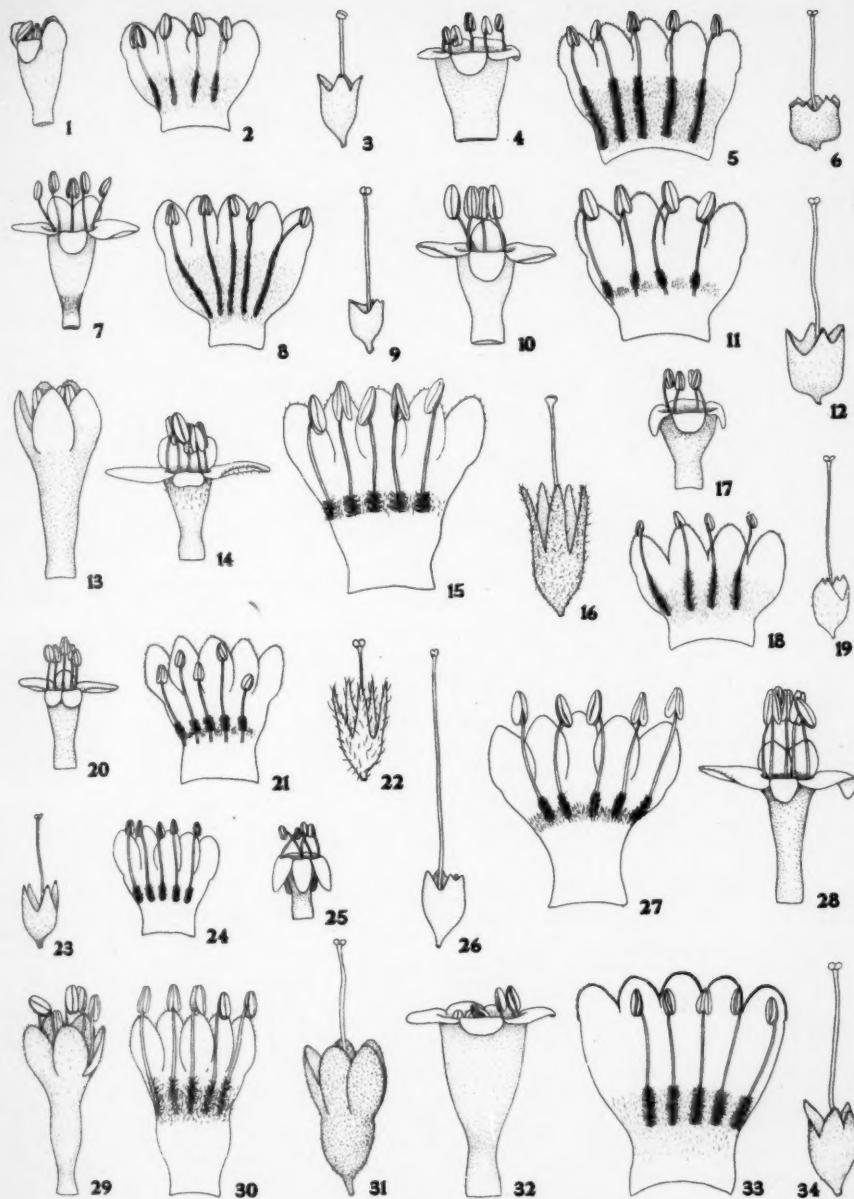


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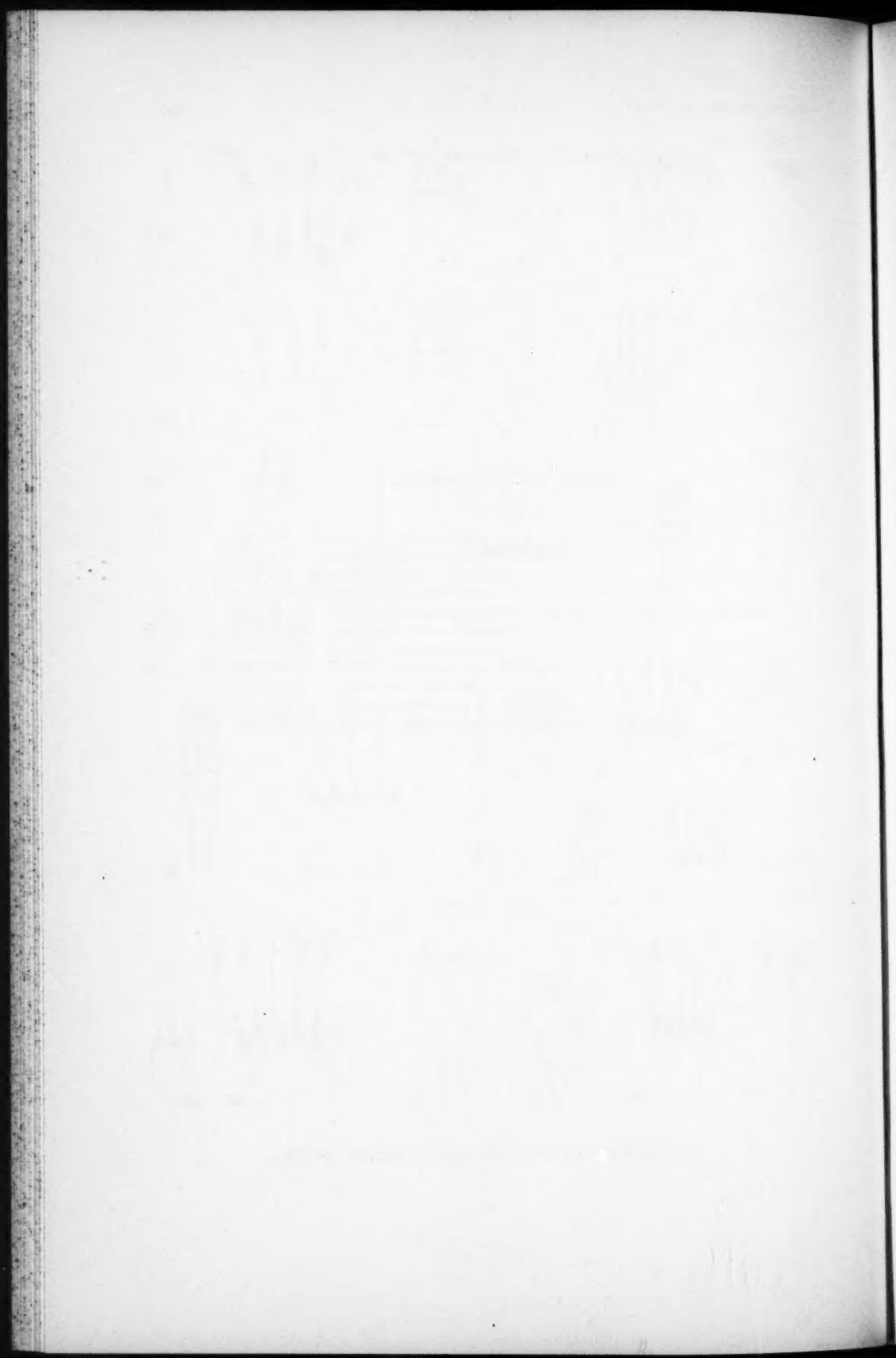
## PLATE 14

Figs. 1-3. *Lycium Morongii* Britton.  
Figs. 4-6. *Lycium Martii* Sendtner.  
Figs. 7-9. *Lycium glomeratum* Sendtner.  
Figs. 10-12. *Lycium vimineum* Miers.  
Figs. 13-16. *Lycium tenuispinosum* Miers. Figure 14 is drawn from the type.  
Figs. 17-19. *Lycium cuneatum* Dammer.  
Figs. 20-22. *Lycium pubescens* Miers.  
Figs. 23-25. *Lycium minimum* C. L. Hitchcock.  
Figs. 26-28. *Lycium infaustum* Miers.  
Figs. 29-31. *Lycium ovalilobum* C. L. Hitchcock.  
Figs. 32-34. *Lycium cyathiformum* C. L. Hitchcock.

All figures  $\times 3$ .



HITCHCOCK — MONOGRAPH OF THE GENUS *LYCIUM*





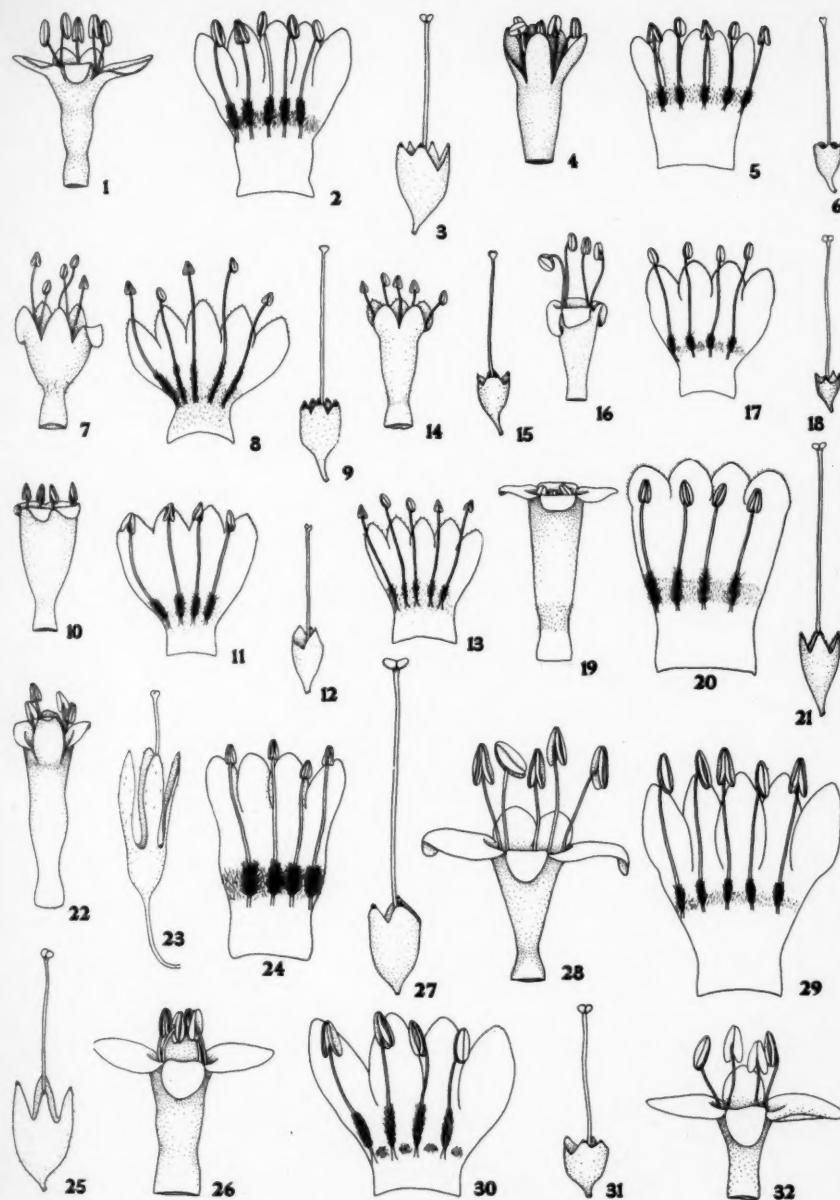
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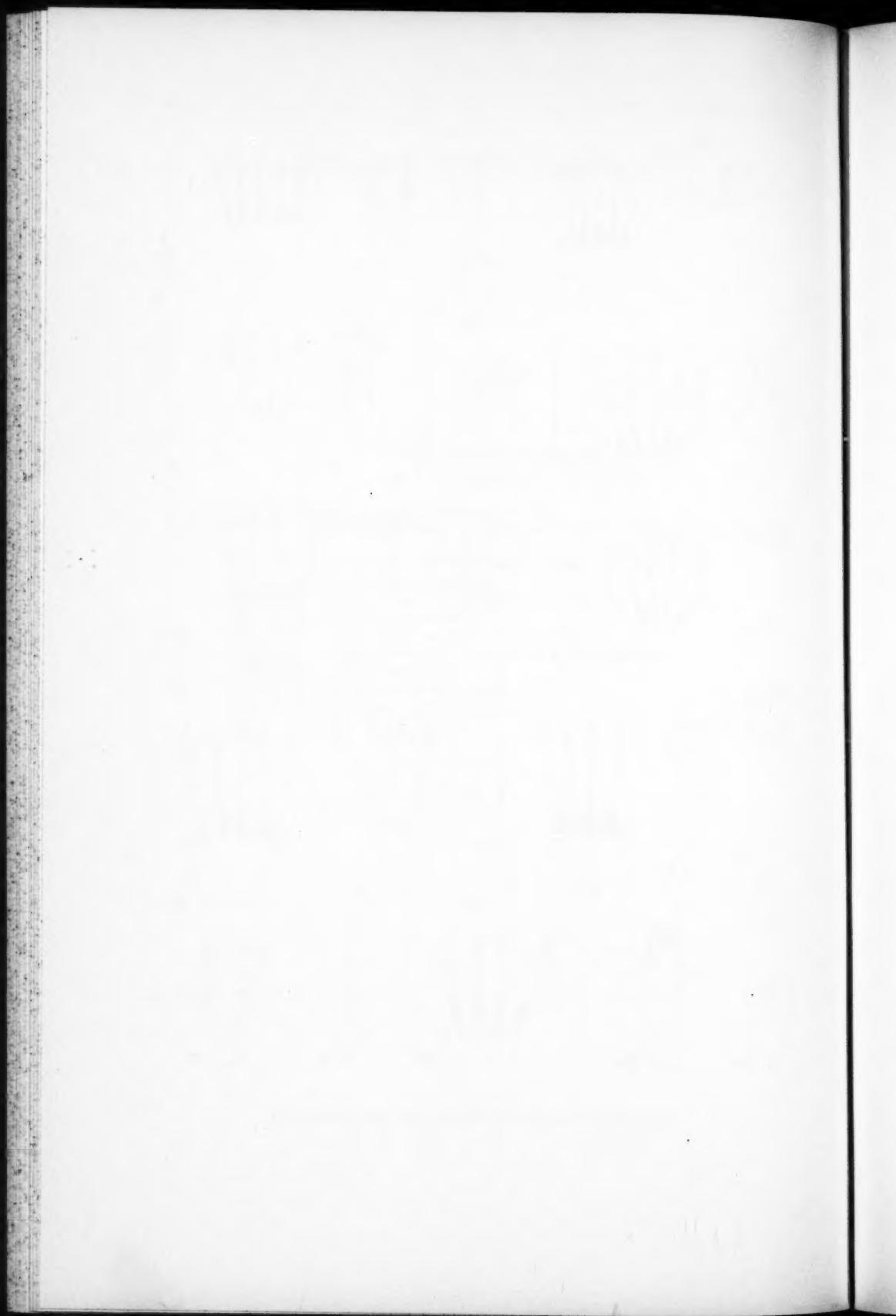
## PLATE 15

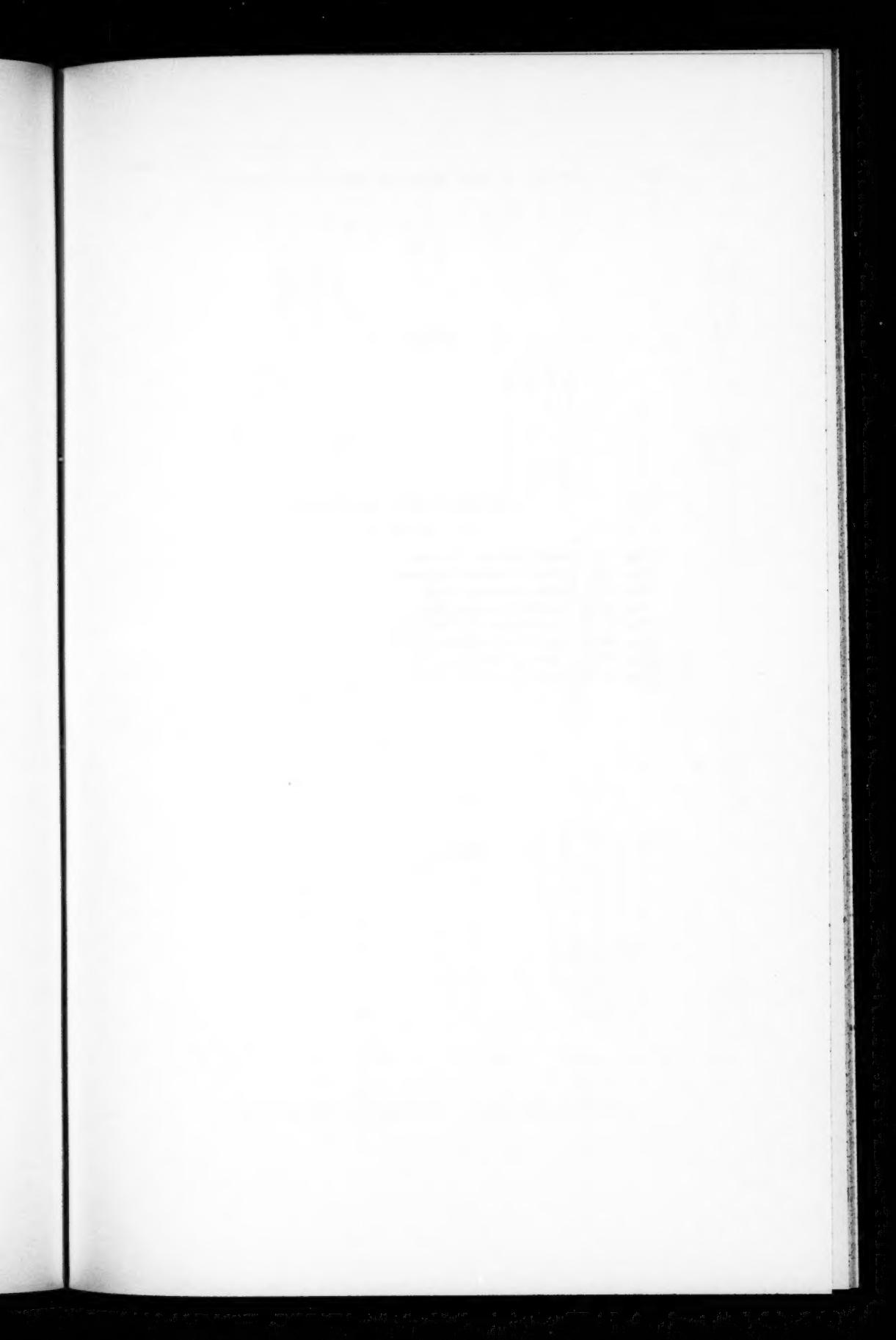
Figs. 1-3. *Lycium Tweedianum* Grisebach.  
Figs. 4-6. *Lycium Tweedianum* var. *chrysocarpum* (Urb. & Ekm.) C. L. Hitchcock.  
Figs. 7-9. *Lycium Berlandieri* Dunal var. *longistylum* C. L. Hitchcock.  
Figs. 10-12. *Lycium Berlandieri* Dunal.  
Figs. 13-15. *Lycium Berlandieri* Dunal var. *brevilobum* C. L. Hitchcock.  
Figs. 16-18. *Lycium nodosum* Miers.  
Figs. 19-21. *Lycium pubitubum* C. L. Hitchcock.  
Figs. 22-24. *Lycium Richii* var. *Hassei* (Greene) I. M. Johnston.  
Figs. 25-26. *Lycium Richii* Gray.  
Figs. 27-29. *Lycium halimifolium* Miller.  
Figs. 30-32. *Lycium carolinianum* Walter.

All figures  $\times 3$ .



HITCHCOCK—MONOGRAPH OF THE GENUS LYCIUM



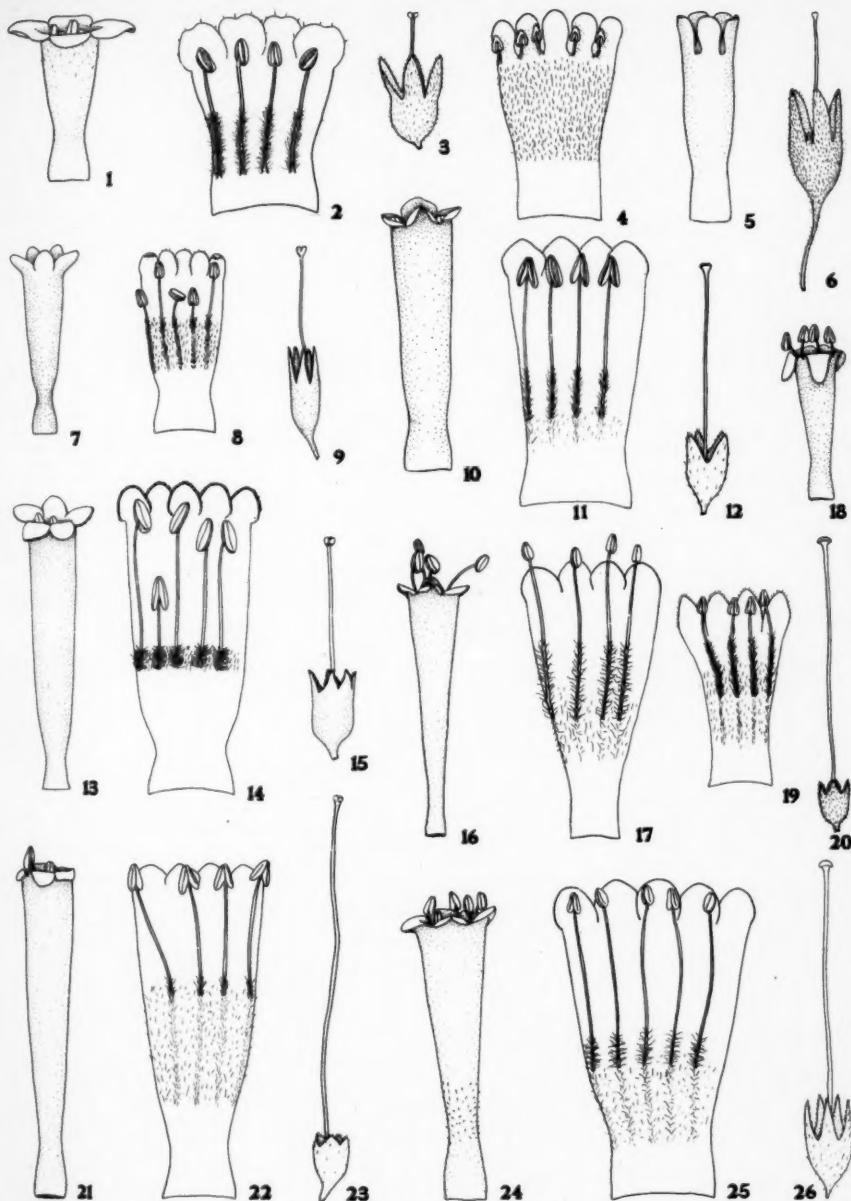


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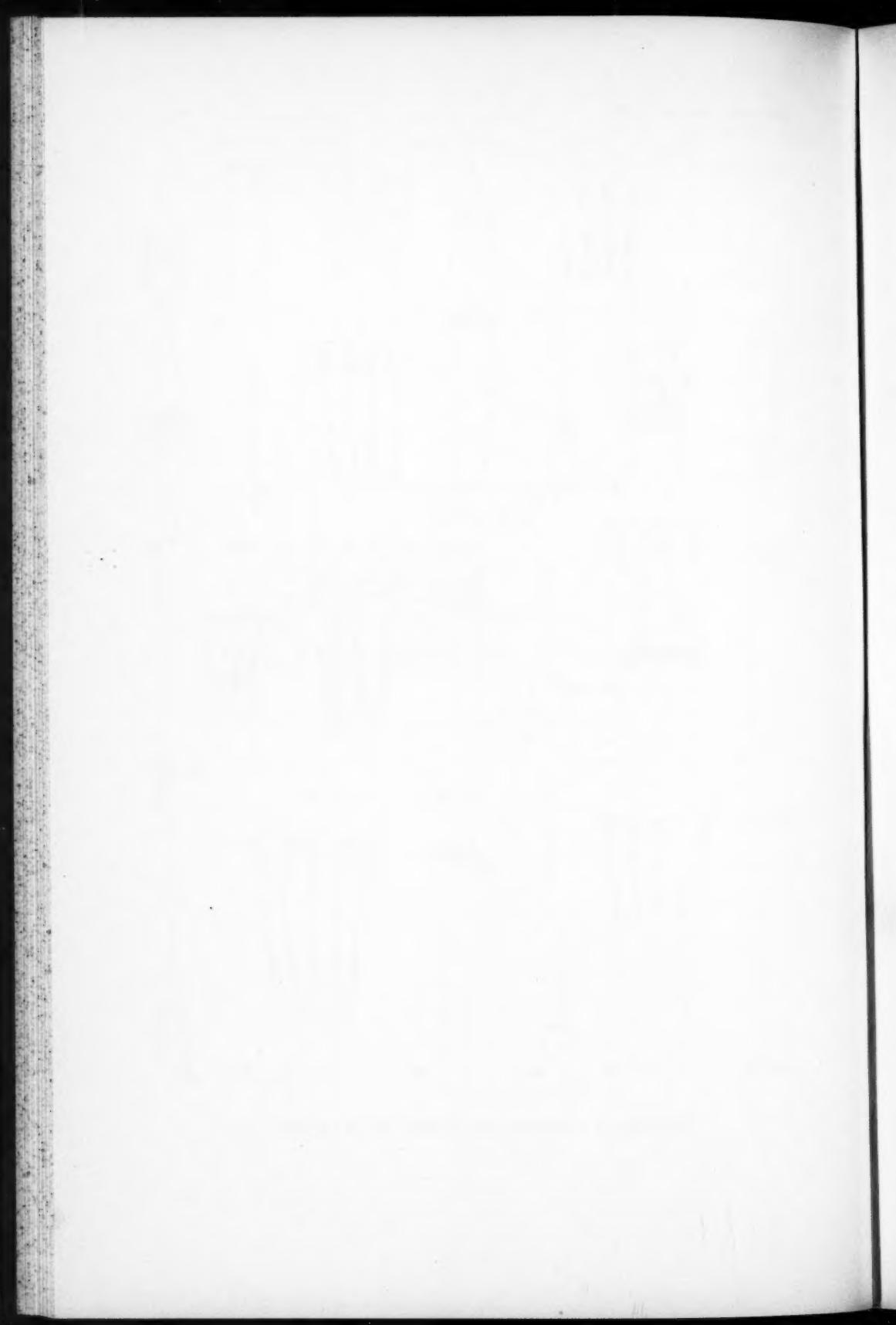
## PLATE 16

Figs. 1-3. *Lycium decipiens* Dammer.  
Figs. 4-6. *Lycium verrucosum* Eastwood.  
Figs. 7-9. *Lycium elongatum* Miers.  
Figs. 10-12. *Lycium fragosum* Miers.  
Figs. 13-15. *Lycium cestroides* Schlechtendahl.  
Figs. 16-20. *Lycium minutifolium* Remy.  
Figs. 21-23. *Lycium Gilliesianum* Miers.  
Figs. 24-26. *Lycium distichum* Meyen.

All figures  $\times 3$ .



HITCHCOCK — MONOGRAPH OF THE GENUS LYCIUM





[VOL. 19, 1932]

## EXPLANATION OF PLATE

## PLATE 17

Figs. 1-3. *Lycium fuscum* Miers.

Figs. 4-6. *Lycium repens* Spegazzini.

Figs. 7-9. *Lycium humile* Philippi.

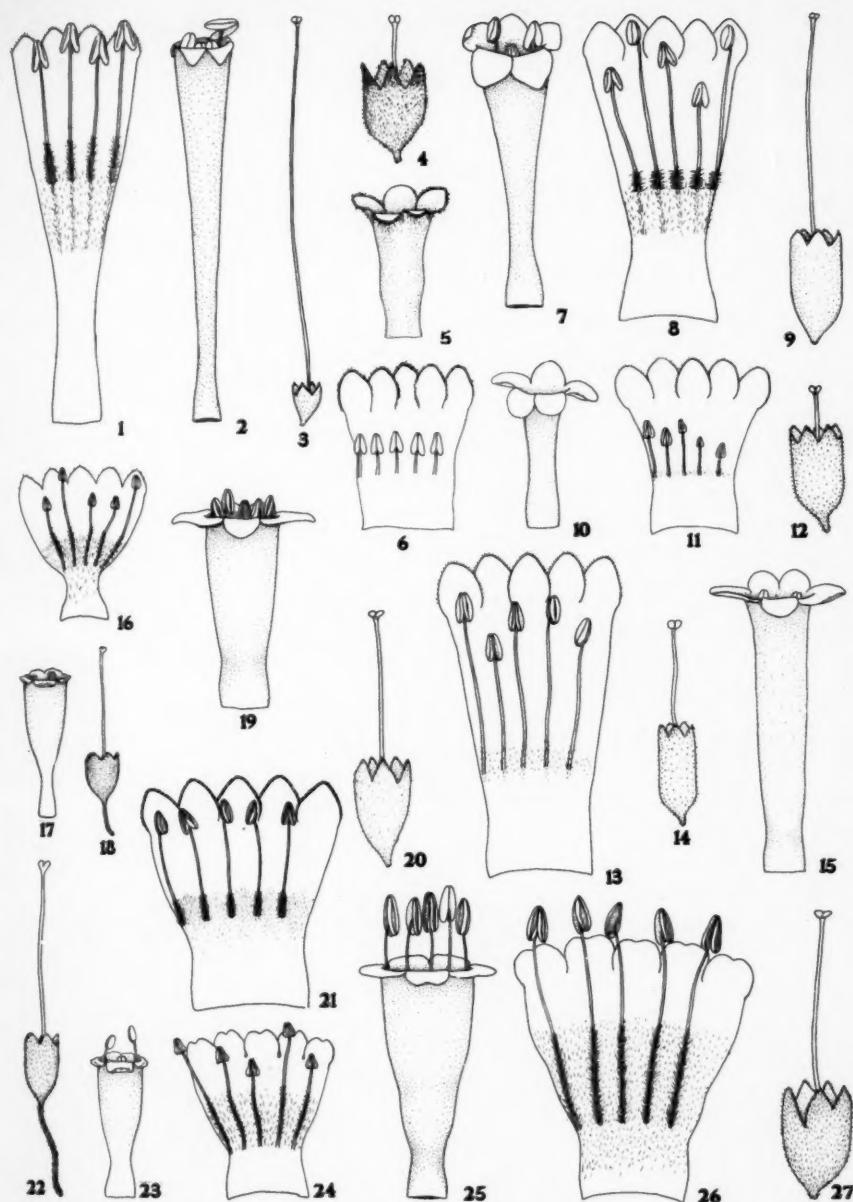
Figs. 10-15. *Lycium Fremontii* Gray. Figures 10-12 represent one common flower-type; figs. 13-15, the other extreme (the species being strikingly dimorphic).

Figs. 16-18. *Lycium exsertum* Gray.

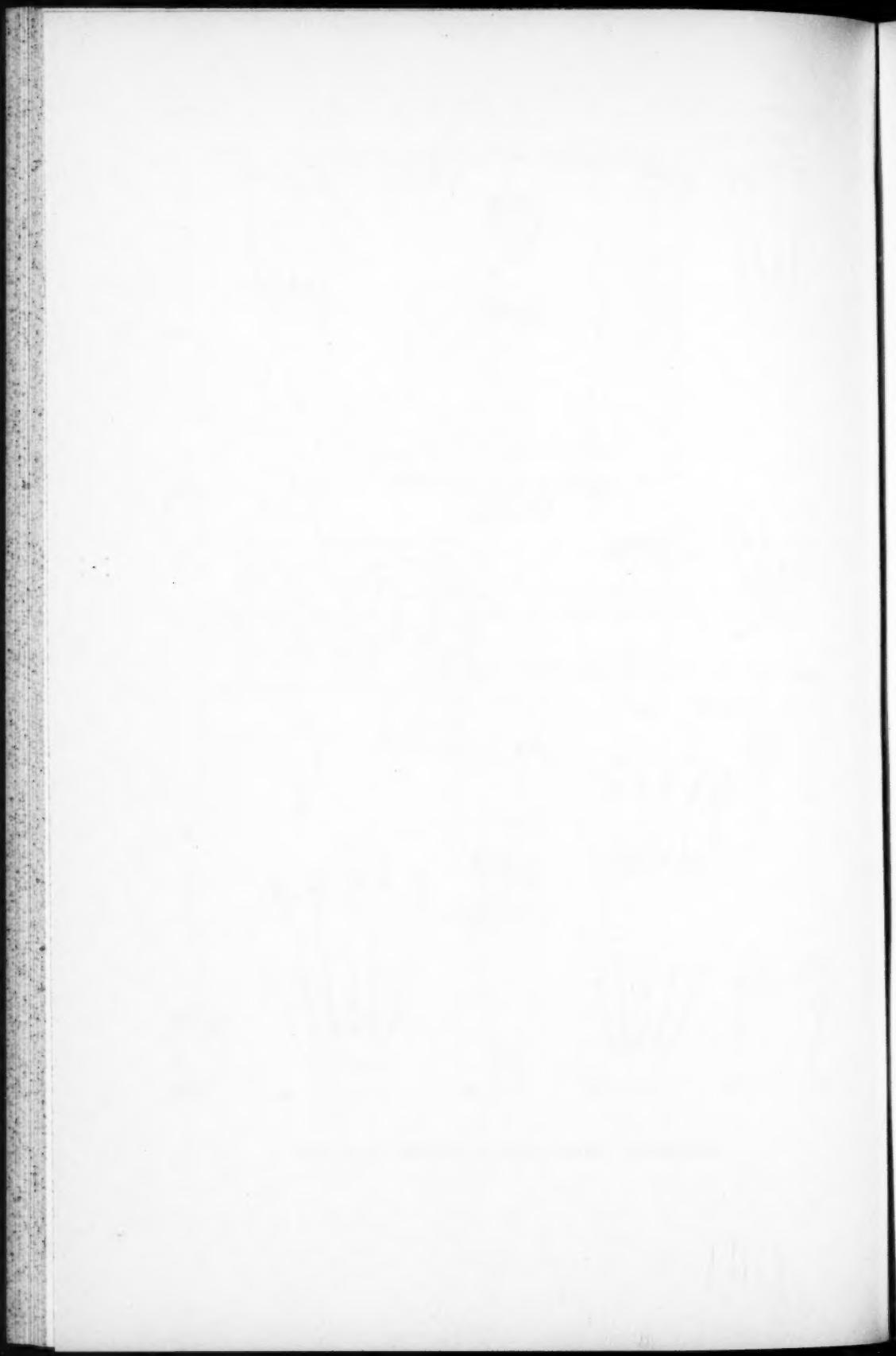
Figs. 19-21. *Lycium Torreyi* Gray.

Figs. 22-27. *Lycium exsertum* Gray. Figures 22-24 represent a flower with partially abortive stamens.

All figures  $\times 3$ .



HITCHCOCK — MONOGRAPH OF THE GENUS LYCIUM





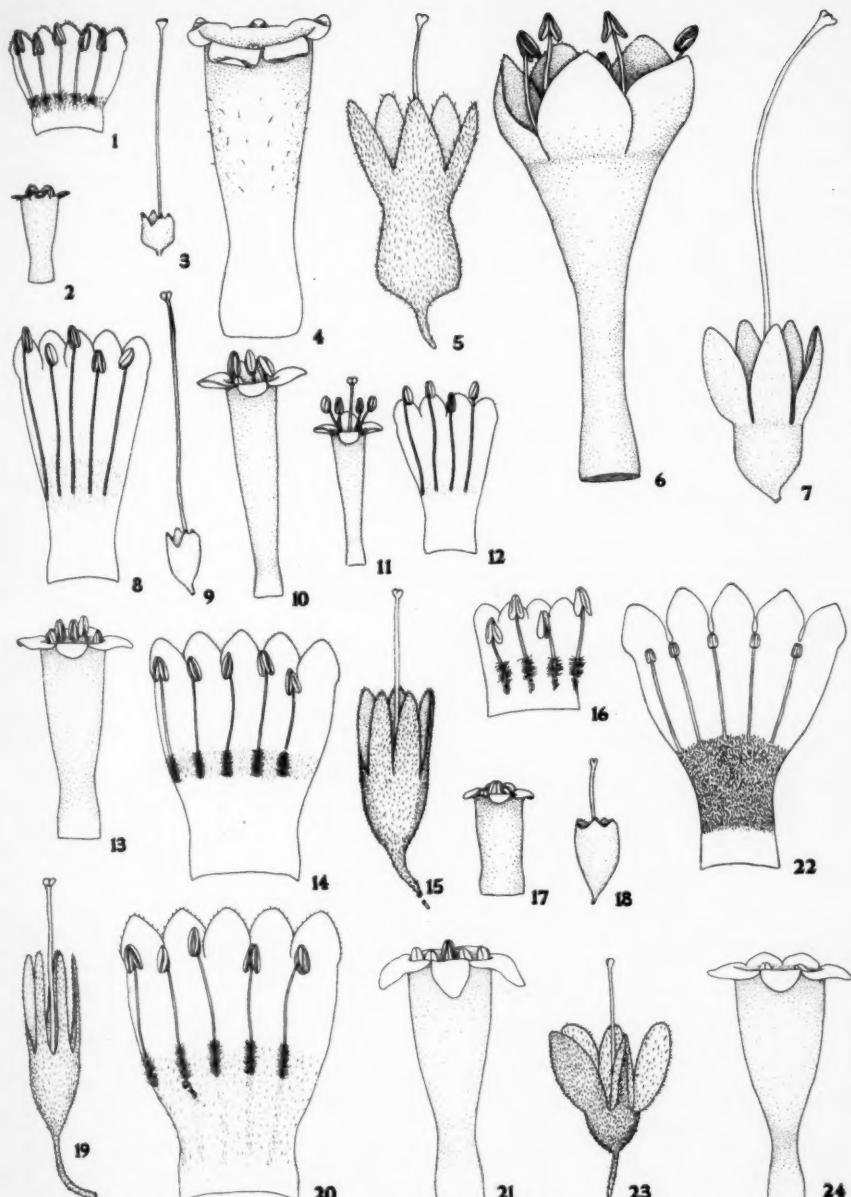
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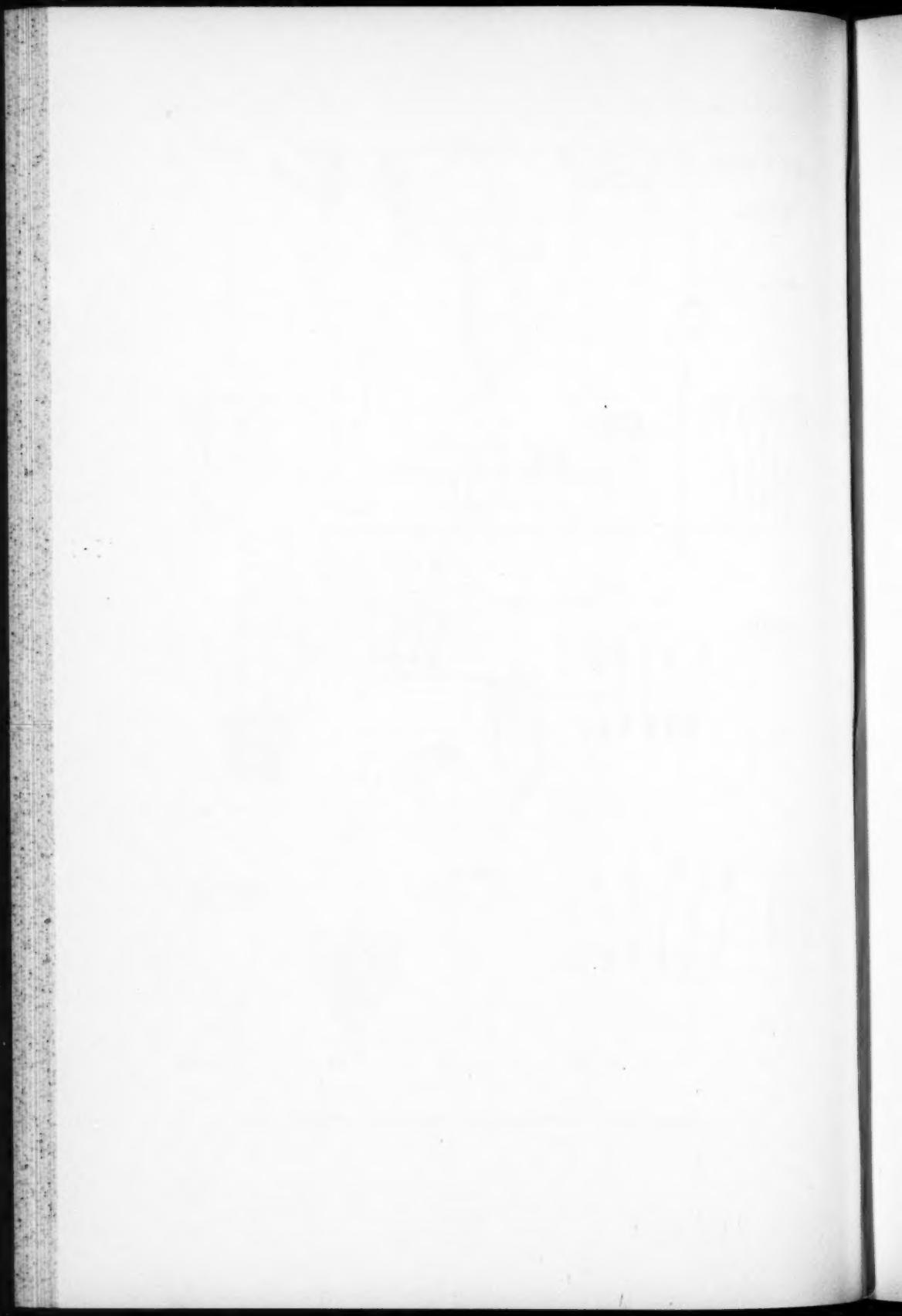
## PLATE 18

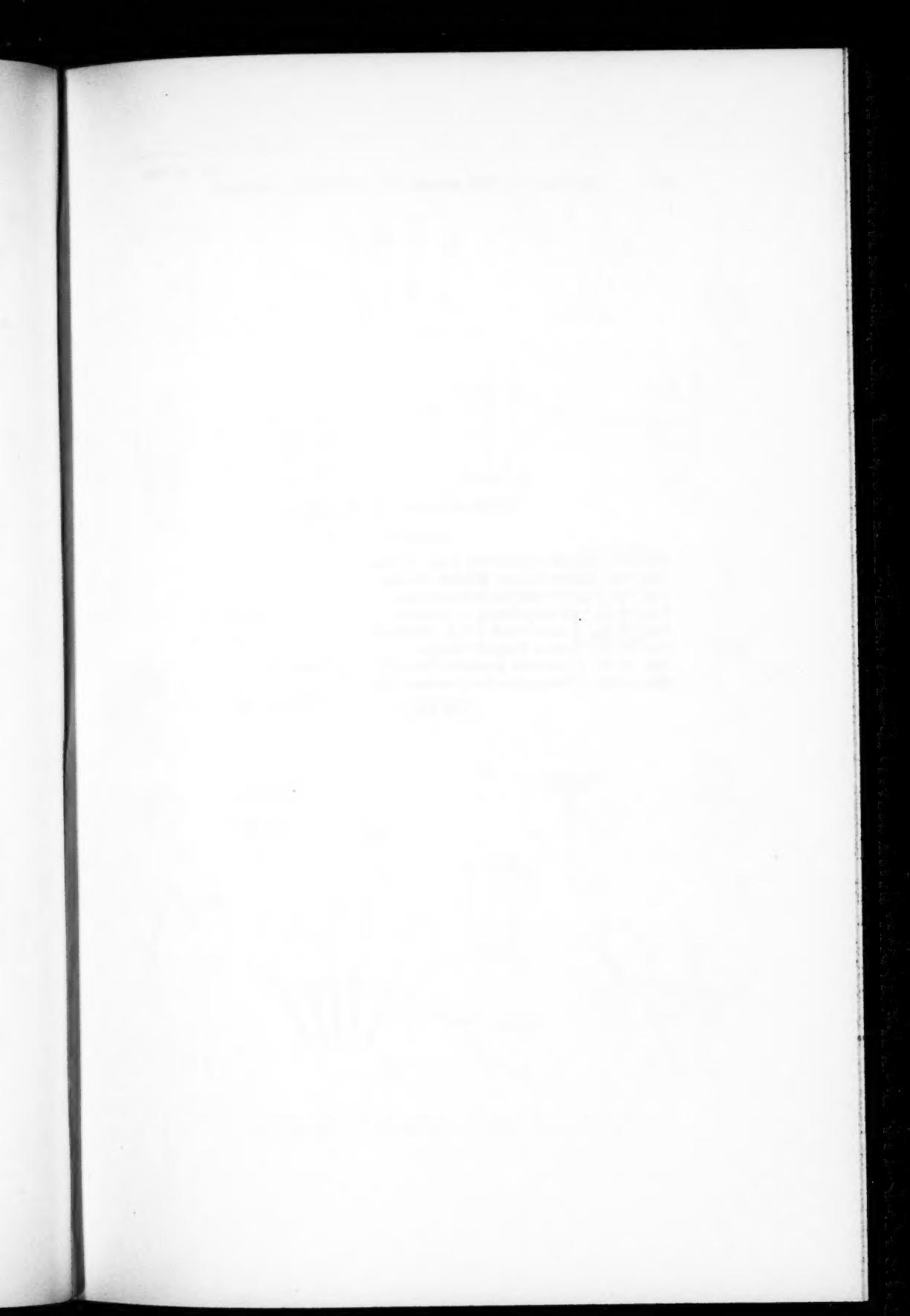
Figs. 1-3. *Lycium Berlandieri* var. *longistylum* C. L. Hitchcock (pistillate flower).  
Figs. 4-5. *Lycium Cooperi* Gray.  
Figs. 6-7. *Lycium pallidum* Miers.  
Figs. 8-10. *Lycium Andersonii* Gray.  
Figs. 11-12. *Lycium Andersonii* var. *Wrightii* Gray.  
Figs. 13-15. *Lycium Parishii* Gray.  
Figs. 16-18. *Lycium Ameghinii* Spegazzini.  
Figs. 19-21. *Lycium macrodon* Gray.  
Figs. 22-24. *Lycium puberulum* Gray.

All figures  $\times 3$ .



HITCHCOCK — MONOGRAPH OF THE GENUS LYCIUM



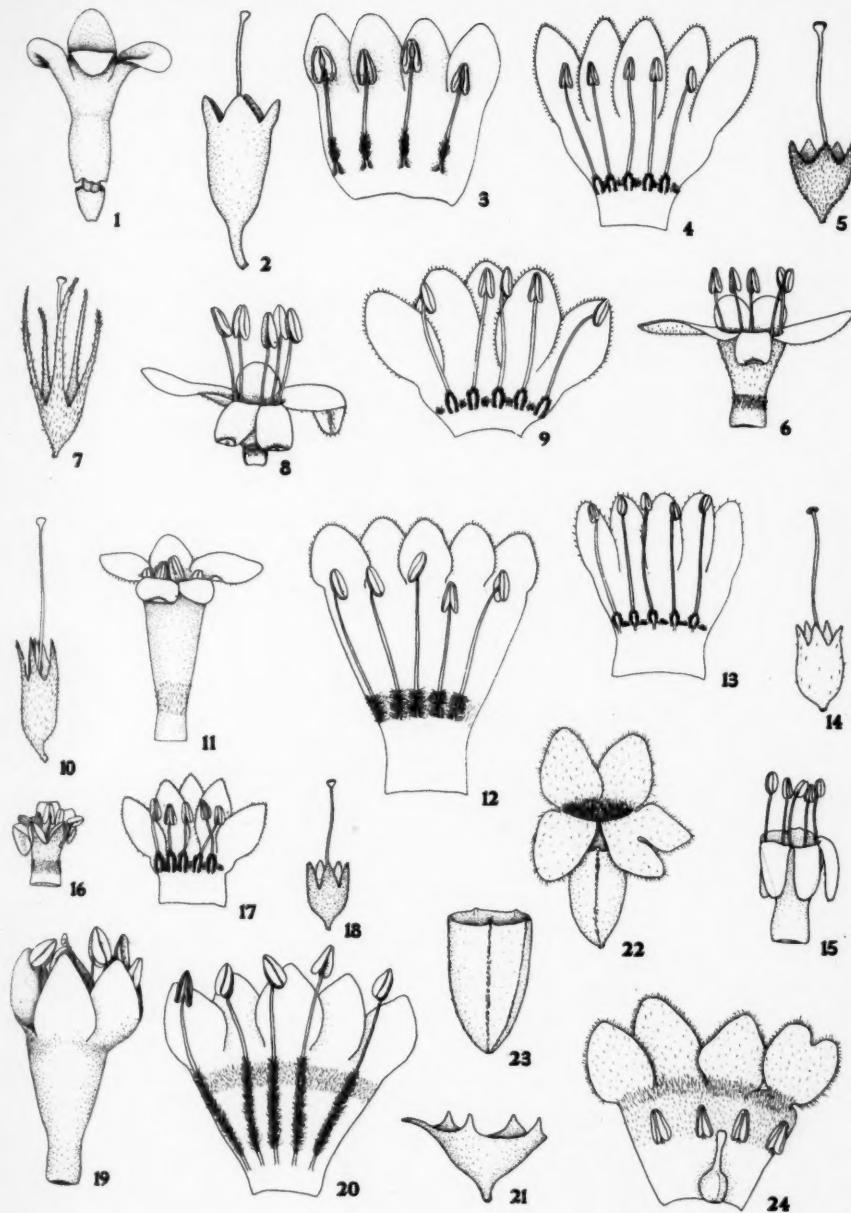


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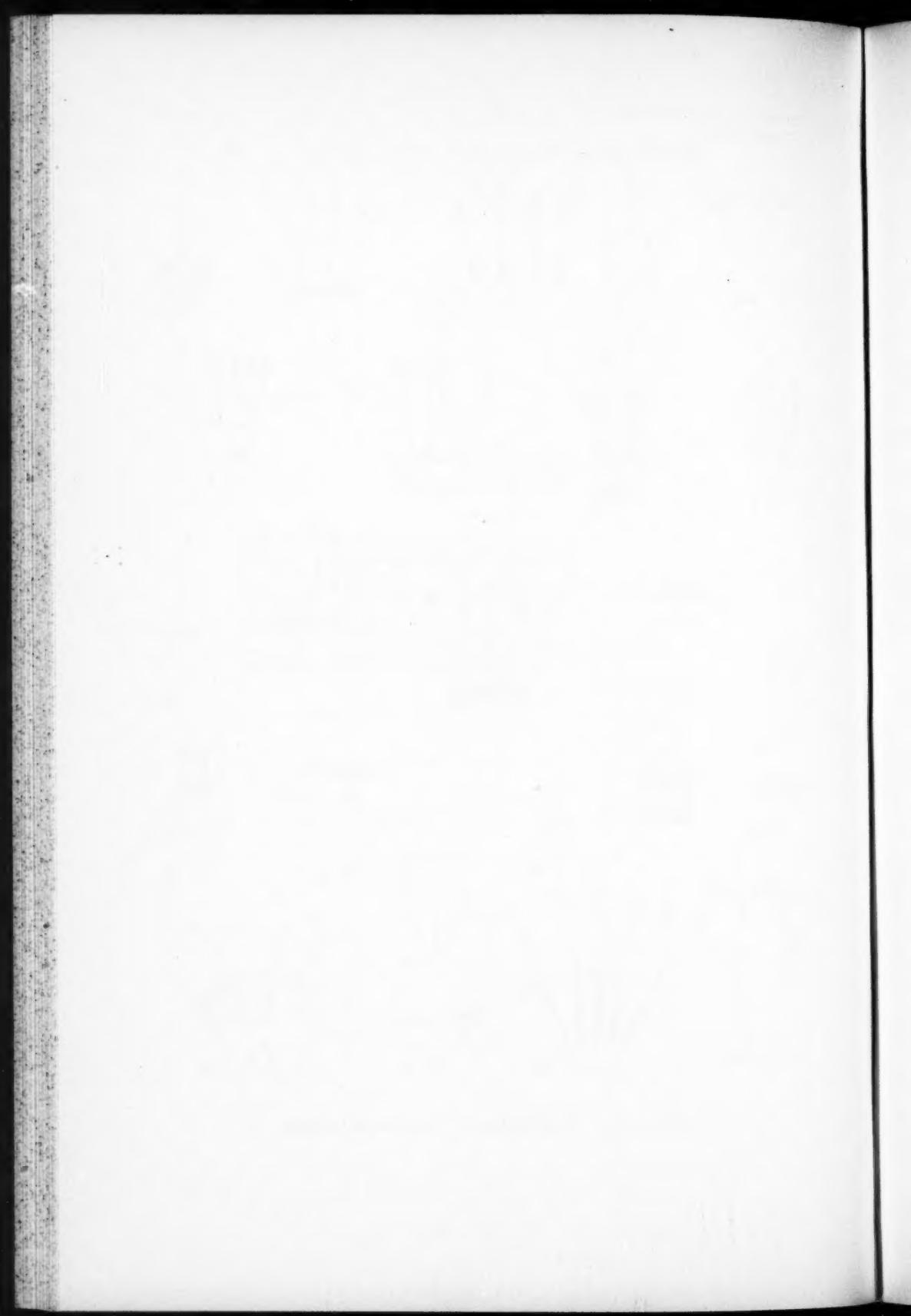
## PLATE 19

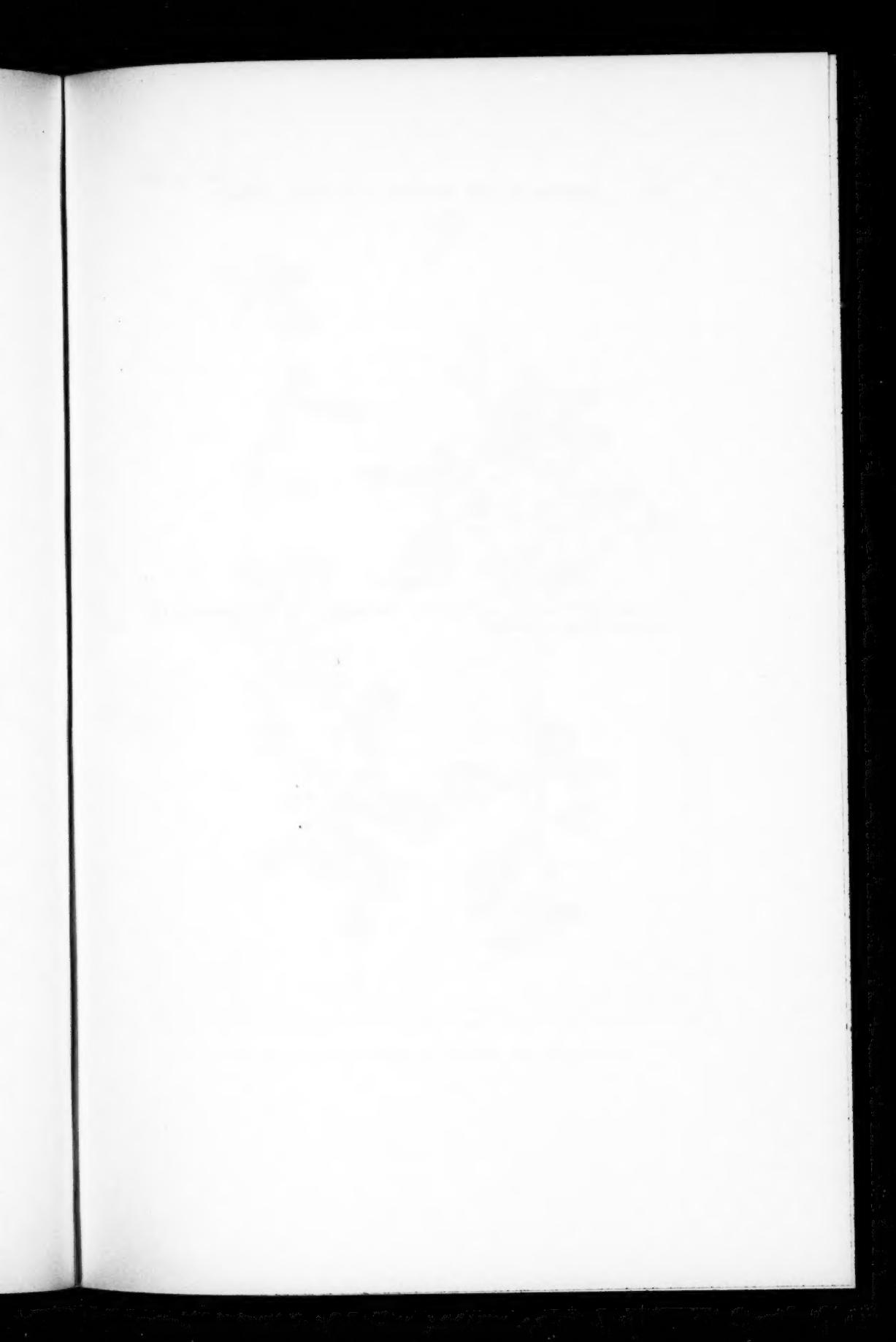
Figs. 1-3. *Lycium californicum* Nutt. ex Gray.  
Figs. 4-6. *Lycium chilense* Miers ex Bertero.  
Figs. 7-9. *Lycium ciliatum* Schlechtendahl.  
Figs. 10-12. *Lycium ciliatum*  $\times$  *cestroides*.  
Figs. 13-15. *Lycium Comberi* C. L. Hitchcock.  
Figs. 16-18. *Lycium Vergarae* Philippi.  
Figs. 19-21. *Grabowskia geniculata* (Fernald) C. L. Hitchcock.  
Figs. 22-24. *Citharexylum brachyanthum* Gray.

All figures  $\times 3$ .



HITCHCOCK—MONOGRAPH OF THE GENUS LYCIUM



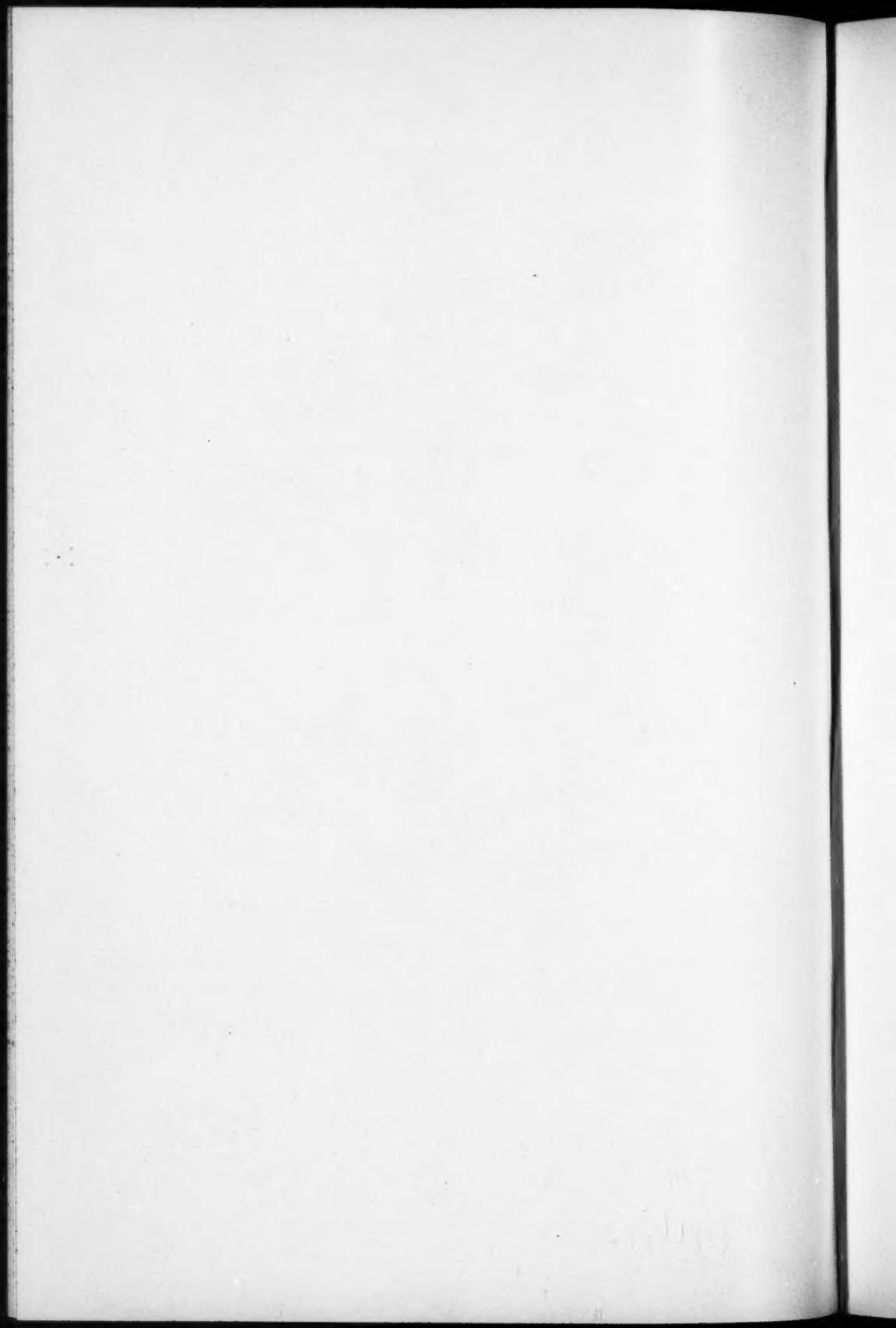


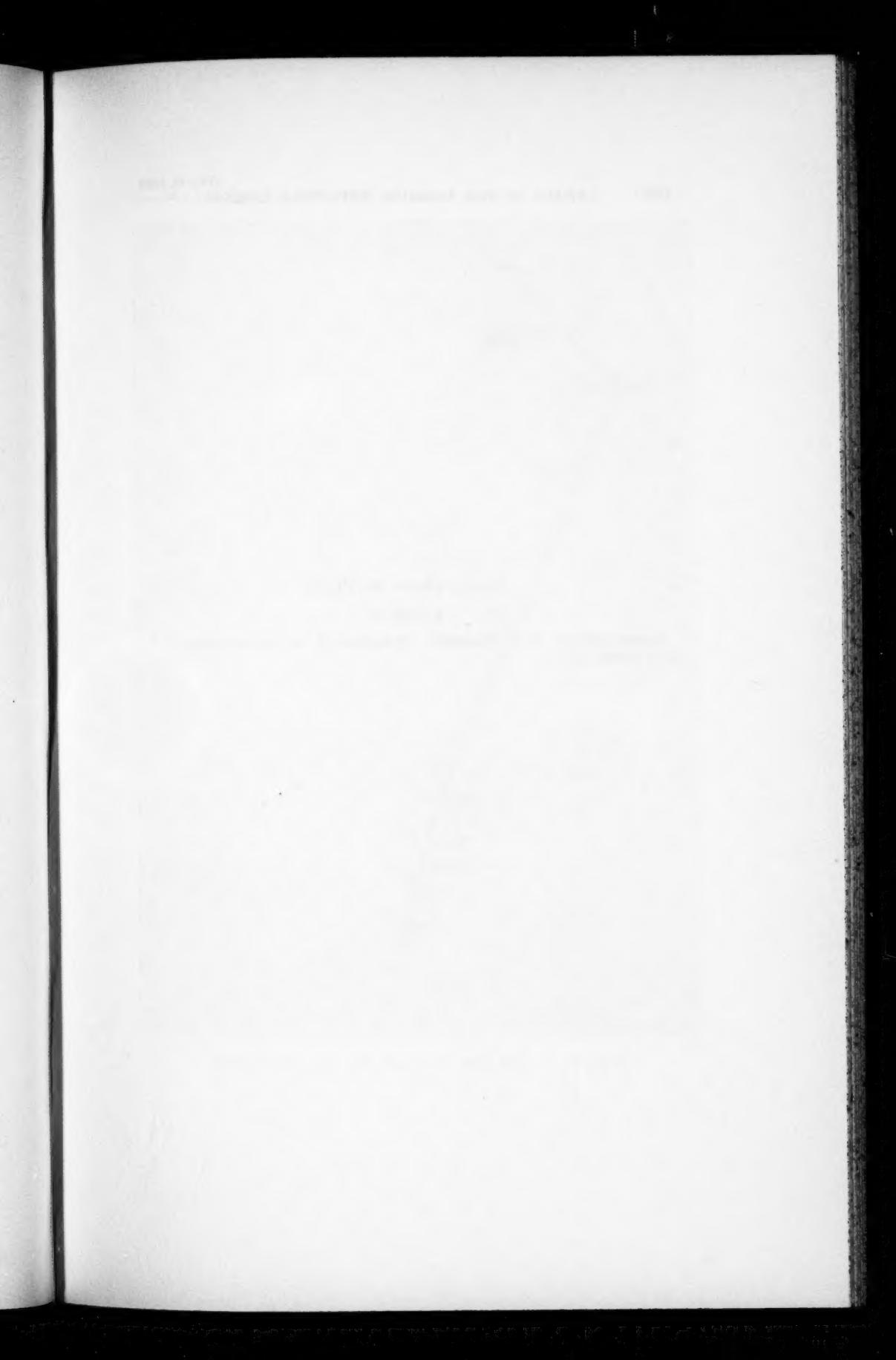
## PLATE 20

*Lycium cyathiformum* C. L. Hitchcock. Photograph of the type specimen at the Stockholm Botanical Museum.



HITCHCOCK—MONOGRAPH OF THE GENUS LYCIUM



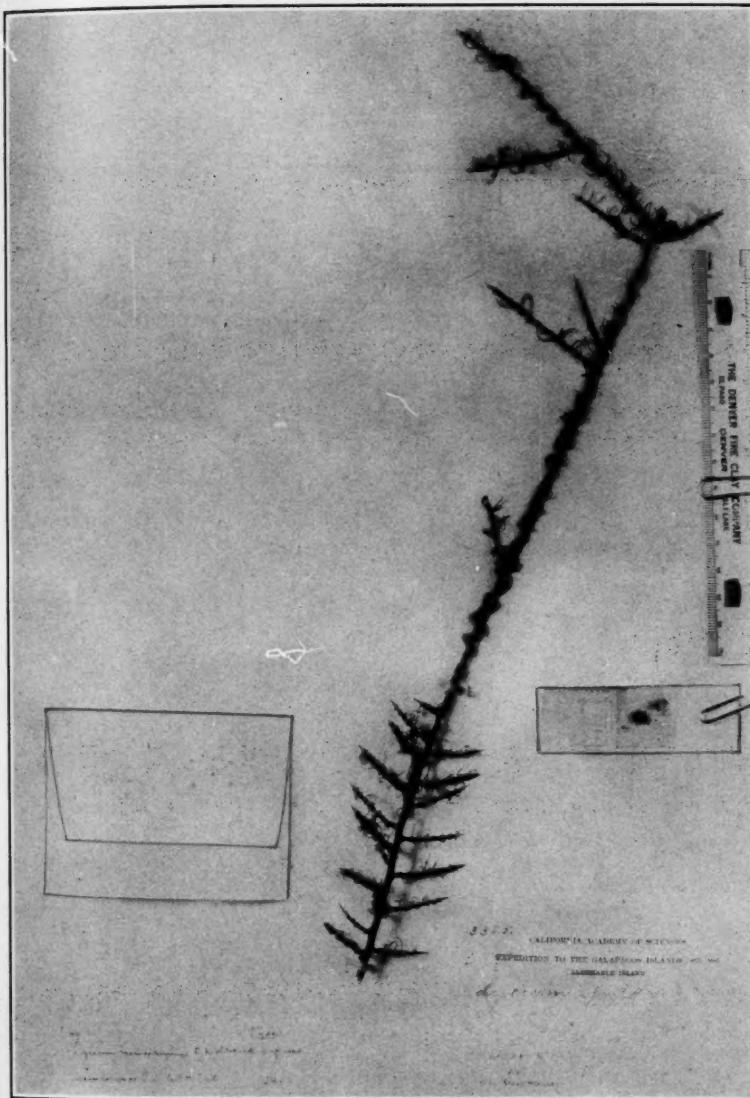


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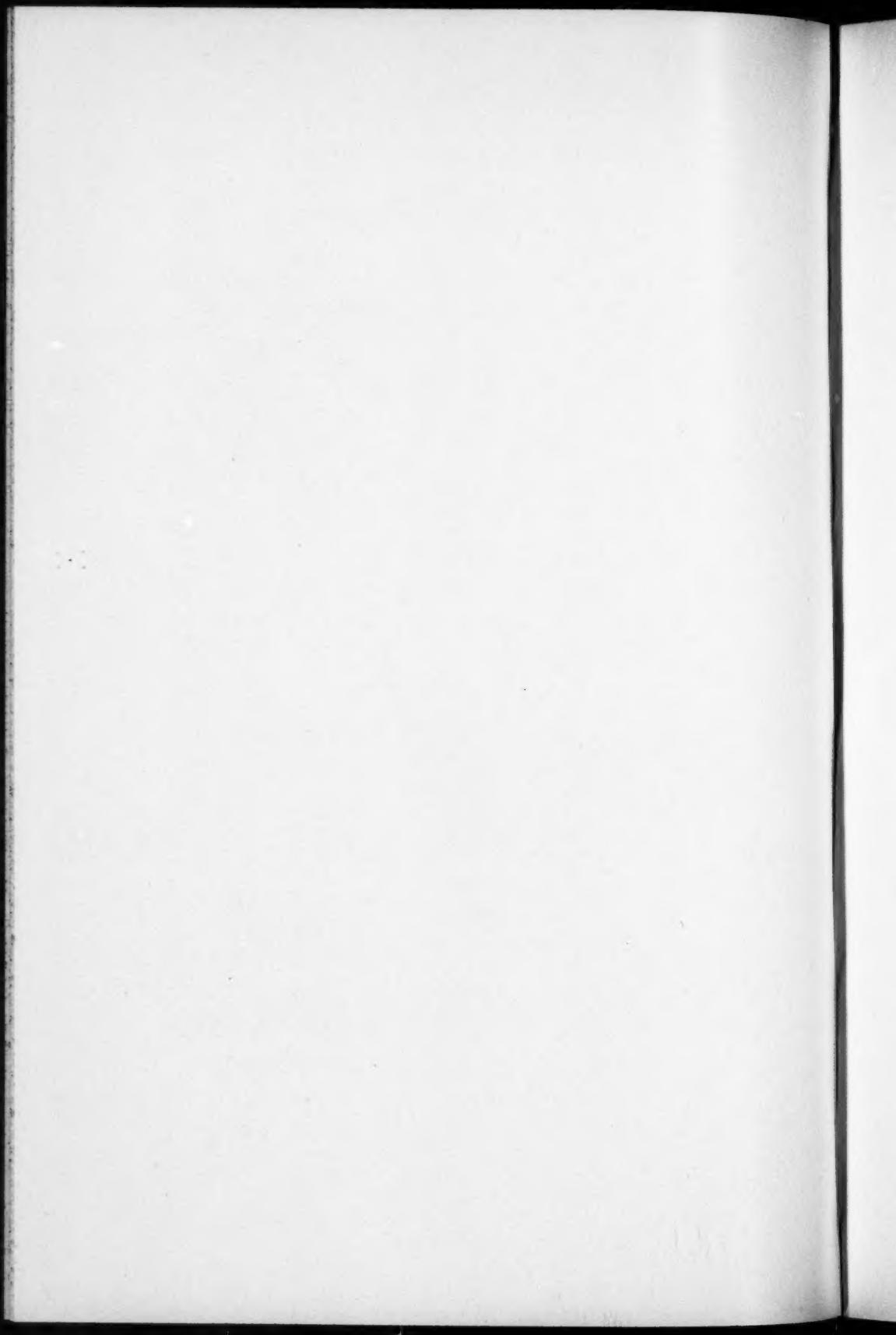
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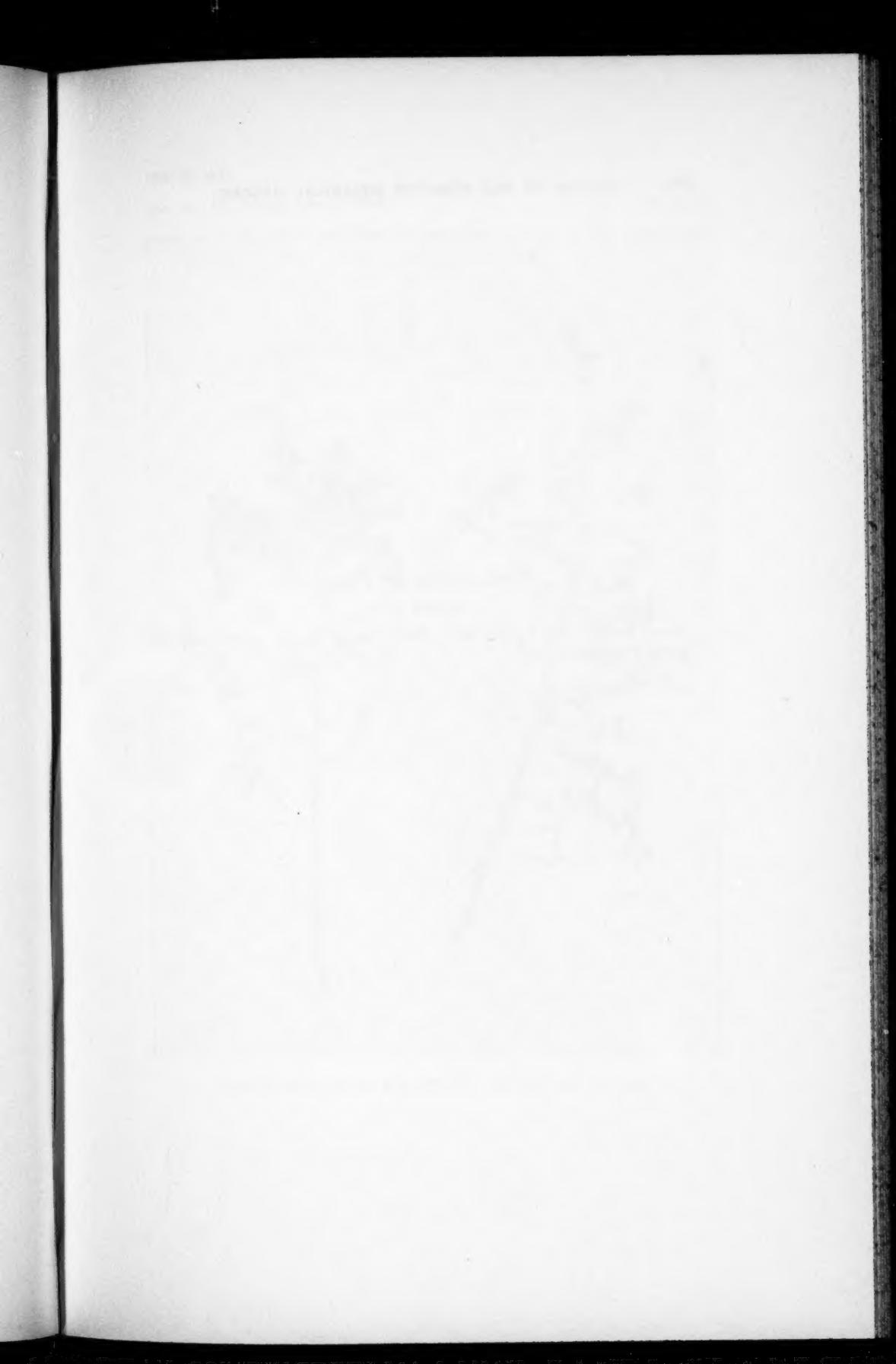
## PLATE 21

*Lycium minimum* C. L. Hitchcock. Photograph of the type specimen at the Gray Herbarium.



HITCHCOCK—MONOGRAPH OF THE GENUS LYCIUM



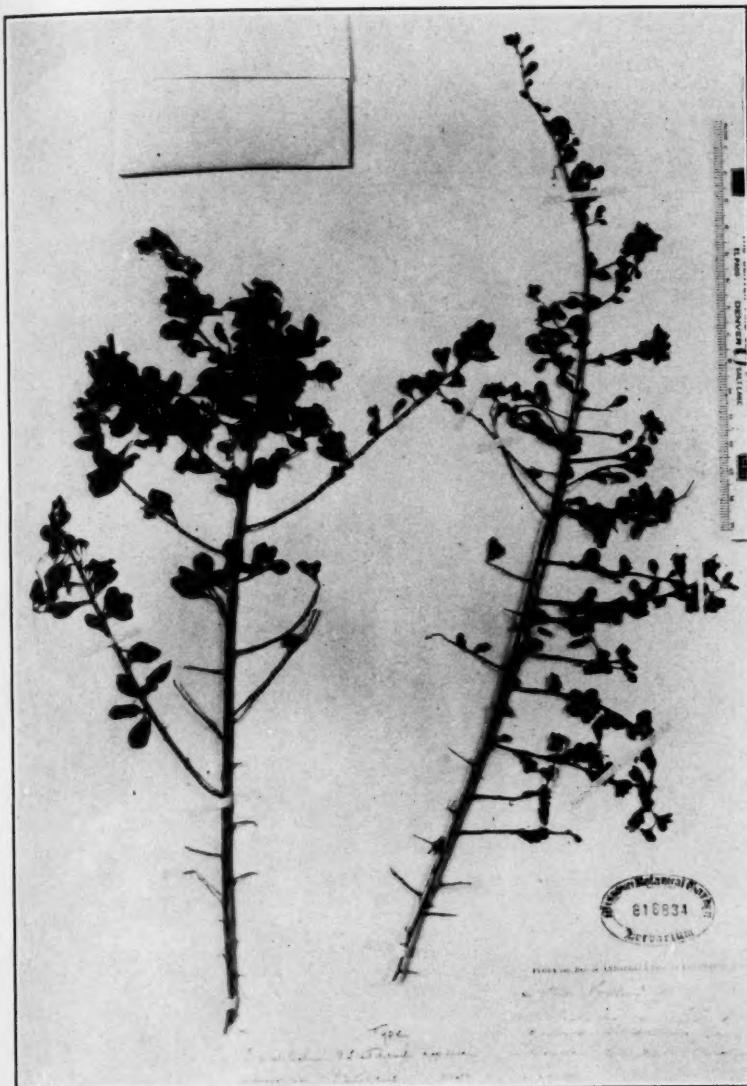


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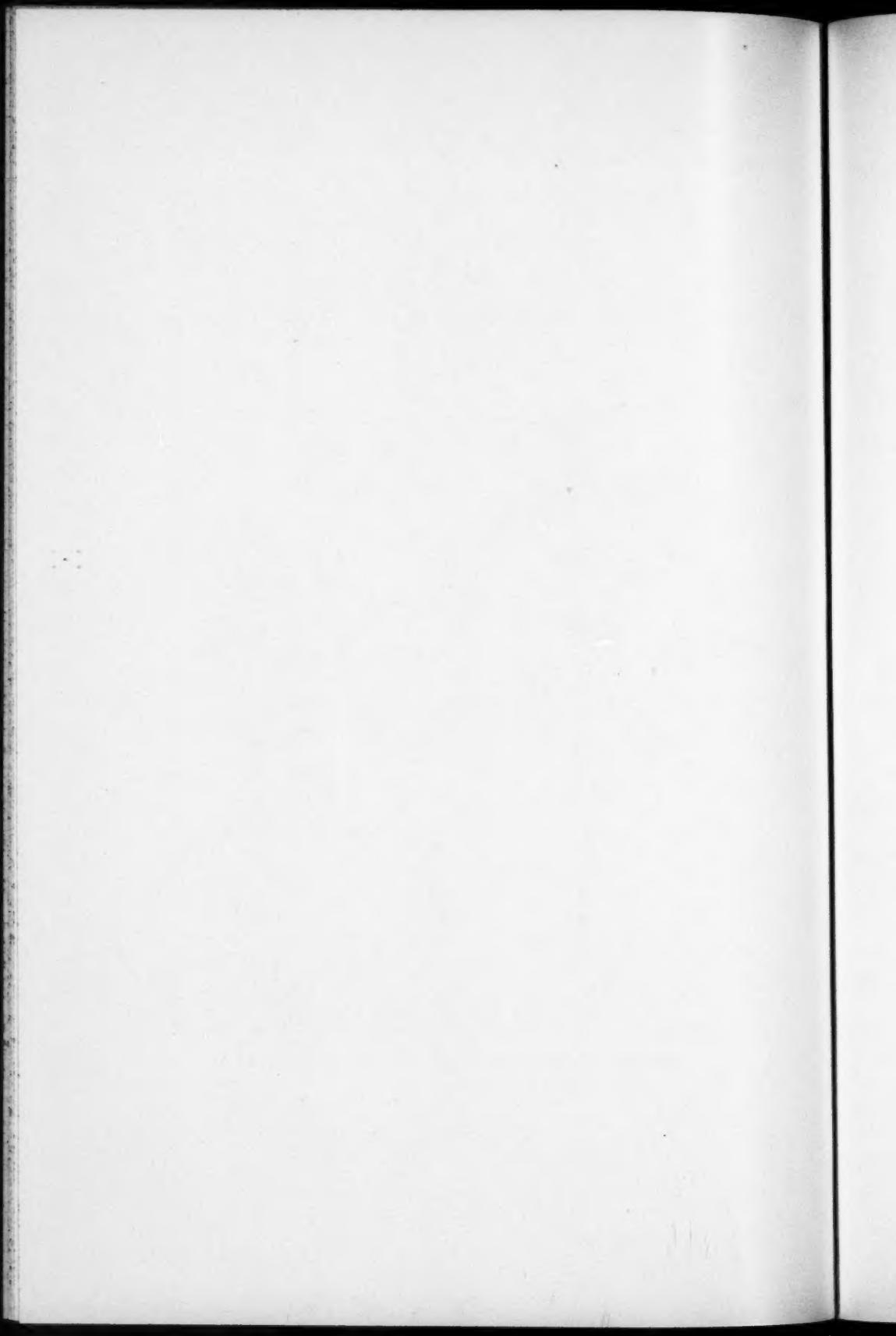
EXPLANATION OF PLATE

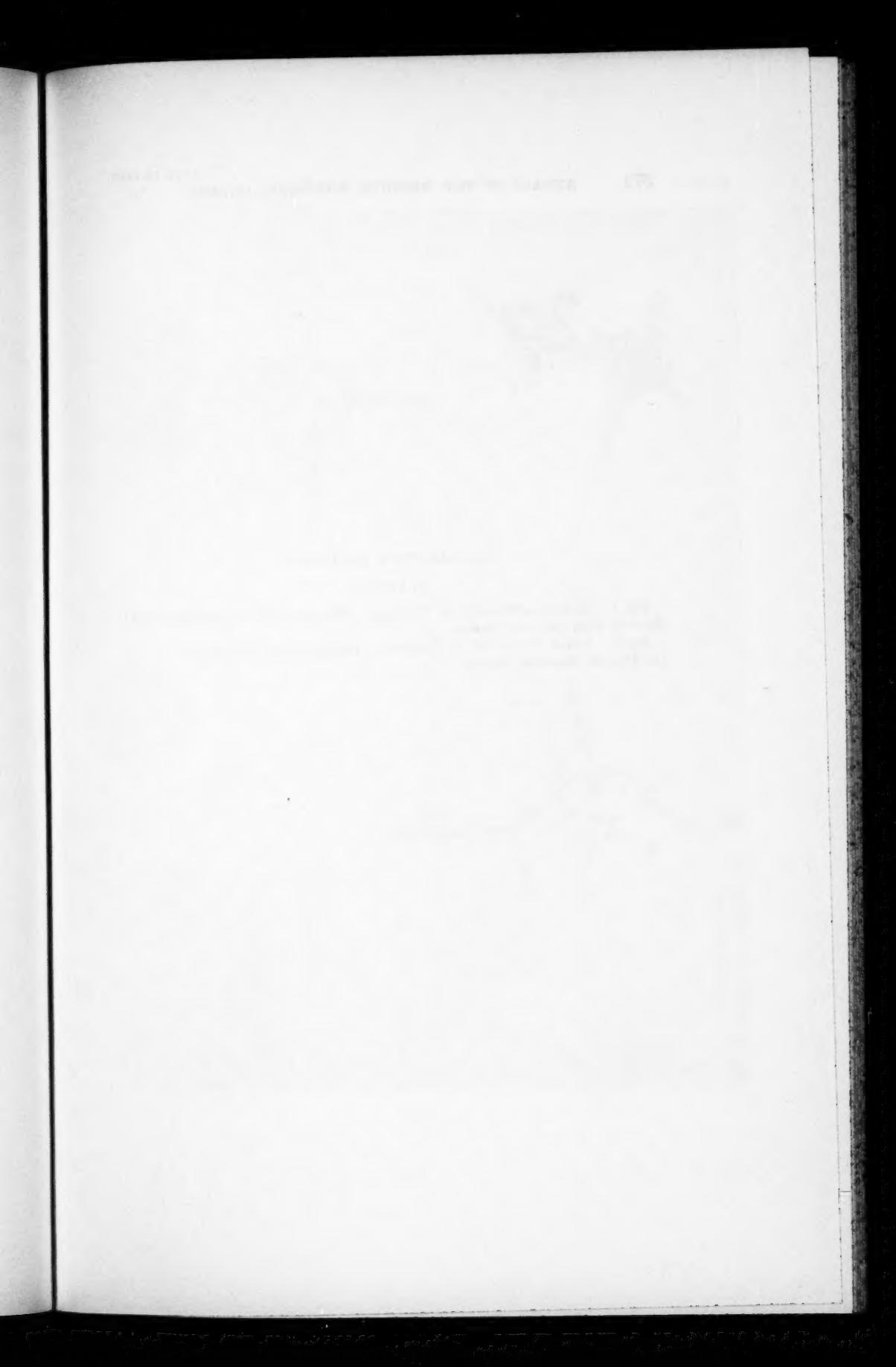
PLATE 22

*Lycium ovalilobum* C. L. Hitchcock. Photograph of the type collection at the Missouri Botanical Garden.



HITCHCOCK—MONOGRAPH OF THE GENUS LYCIUM



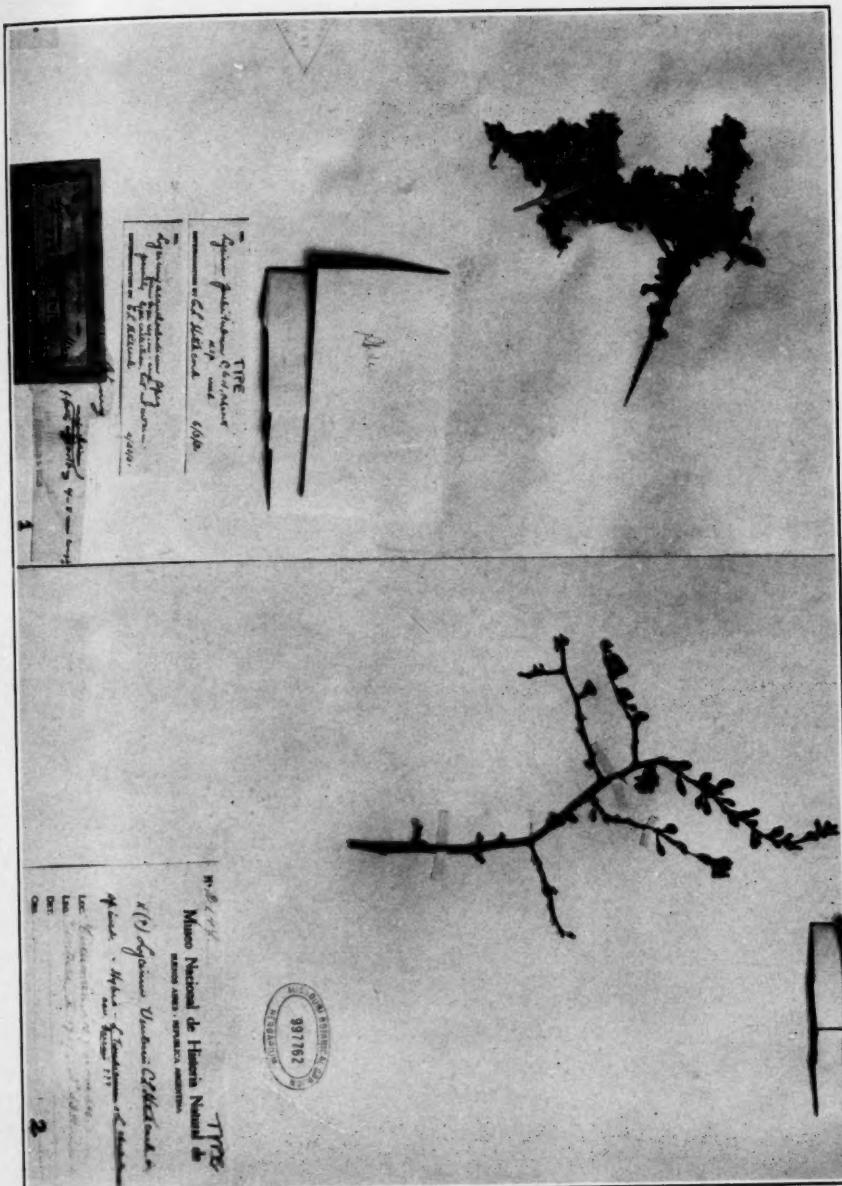


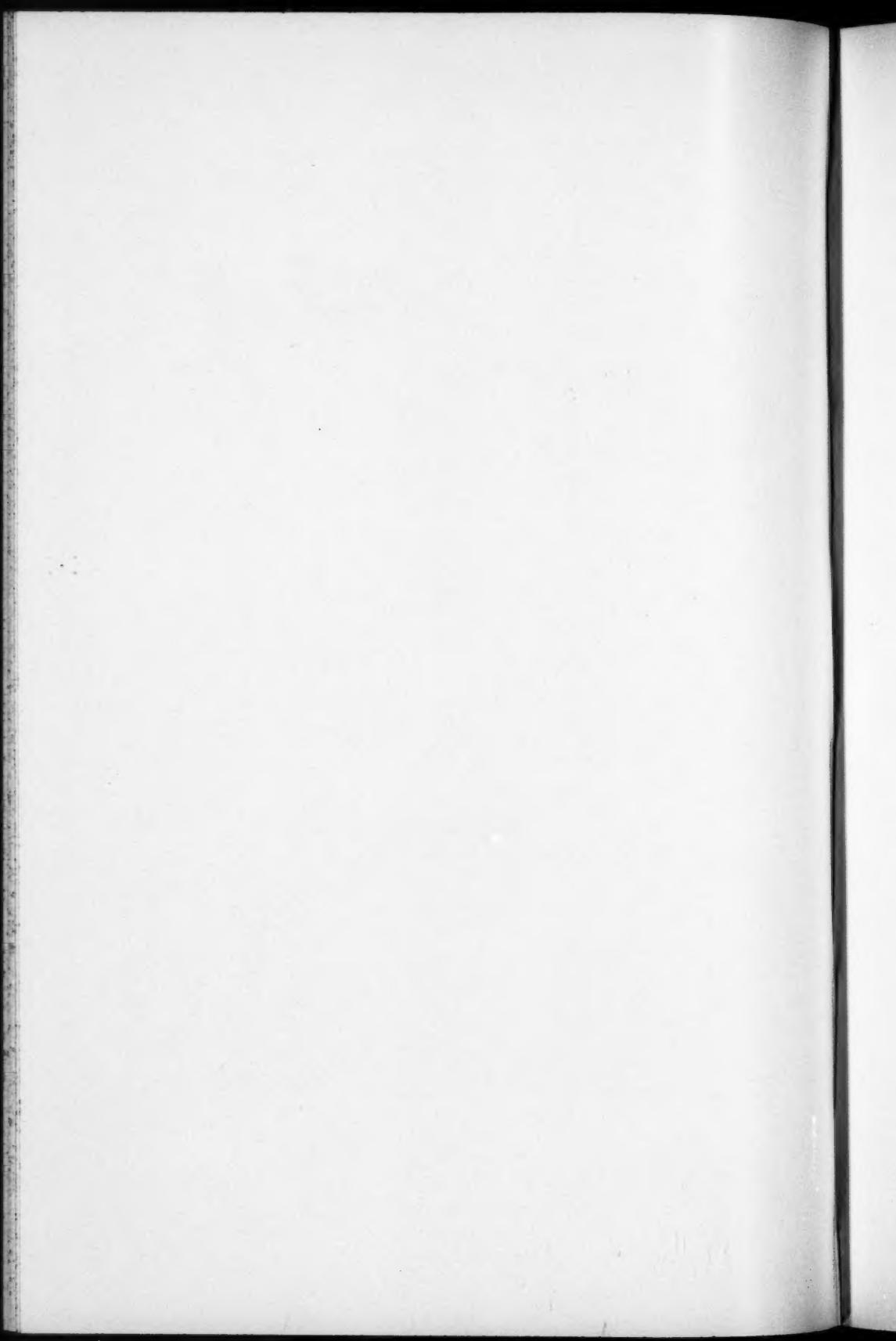
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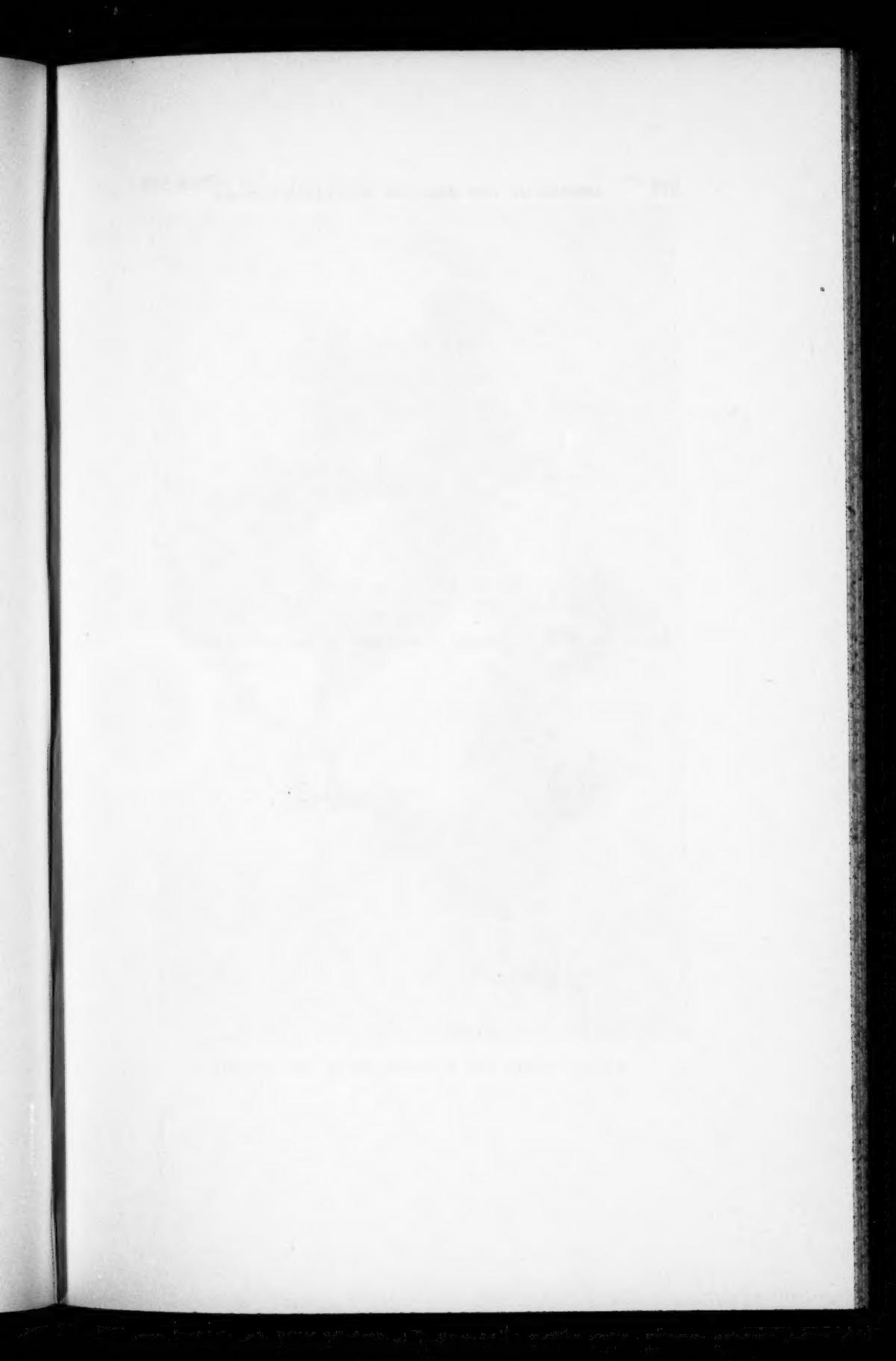
## PLATE 23

Fig. 1. *Lycium pubitubum* C. L. Hitchcock. Photograph of the type specimen at the New York Botanical Garden.

Fig. 2. *Lycium Venturii* C. L. Hitchcock. Photograph of the type specimen at the Missouri Botanical Garden.



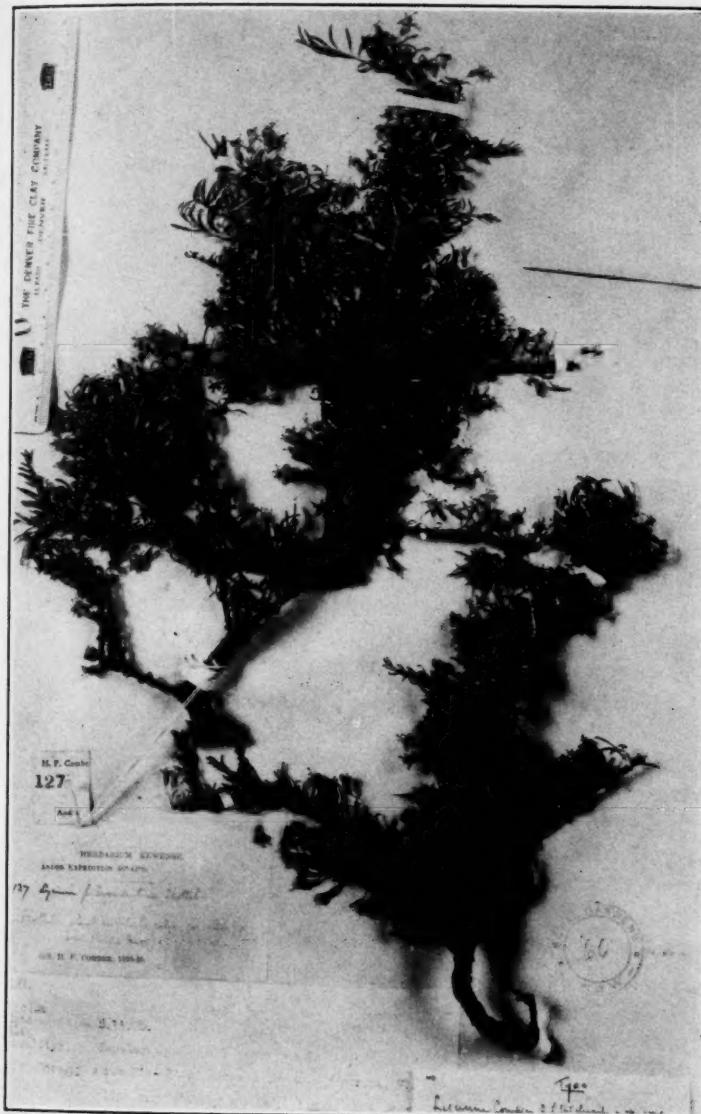




EXPLANATION OF PLATE

PLATE 24

*Lycium Comberi* C. L. Hitchcock. Photograph of the type specimen at Kew.



HITCHCOCK—MONOGRAPH OF THE GENUS LYCIUM

